



STUDY OF THE POPULATION OF TWO SUBSPECIES OF *Heliconius* KLUK, 1780 BUTTERFLIES (LEPIDOPTERA: NYMPHALIDAE)

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INTRODUÇÃO

The study of population biology has been an important tool for understanding the ecological stability of species in natural environments. Several studies have demonstrated that insect populations are sensitive to seasonal variations and anthropic changes, and this fact makes them good environmental bioindicators (see Price *et al.*, 2011). Among butterflies, species of Heliconiinae (Nymphalidae) are example of environmental bioindicators. Furthermore, they are significantly diverse and relatively easy to sample and to identify in tropical regions (Ockinger *et al.*, 2006).

OBJETIVOS

In this study, we aimed to contribute to the knowledge of population biology of two subspecies of *Heliconius*, describing and comparing the population biology of them, especially in relation to the population size, sex ratio, seasonal variation of body size and time of residency in an antropic environmental with a period of one year.

MATERIAL E MÉTODOS

The study was carried out at the Parque Municipal Bosque John Kennedy (PMBJK), located inside the urban perimeter of the town of Araguari, Minas Gerais State, Brazil (48°11'19"W and 18°38'35"S). Most of the area (11.2 ha) is occupied by a seasonal semi-deciduous forest, despite being an urban forest subject to human action, this area still retains high natural floristic diversity. The two subspecies of *Heliconius* monitored in this study were *Heliconius erato phyllis* (Fabricius, 1775) and *Heliconius ethilla narcaea* Godart, 1819. The observations were carried out from August 2010 to July 2011. The major pathways in the PMBJK were sampled twice a week between 09 a.m. and 03 p.m., period of highest butterflies activity. *Heliconius erato phyllis* and *H. ethilla narcaea* adults were captured with entomological nets and numbered with a black permanent felt-tipped pen in the underside of forewings, according to Ruszczyk and Nascimento (1999) methodology. Recaptured individuals and newly marked ones and sex were recorded. The right forewings of captured individuals were measured (in centimeters) using a manual caliper; these measures represented the individual body size.

RESULTADOS

Individuals of *H. erato phyllis* were more abundant than *H. ethilla narcaea* over time, however the number of observed individuals and the average number of estimated individuals through months were not different ($Z=0.737$,

$P=0.461$, and $Z=1.339$, $P=0.181$, respectively; Z test). The population of *H. erato phyllis* showed abundance peak of individuals in August 2010, March and May 2011, while *H. ethilla narcaea*, showed abundance peak in August 2010, December and May 2011. Although there was not significant difference in sex ratio in *H. erato phyllis*, females were more abundant than males ($RS=1.95$, $\chi^2=12.67$, $P=0.33$; Chi-square test). This pattern was similar for almost all months, except for December 2010 and July 2011, when a greater number of males were found, and in August 2010, when the number of males and females was similar. An opposite pattern was evident in the *H. ethilla narcaea* population, in which males were significantly more abundant than females ($RS=2.5$, $\chi^2=16.63$, $P=0.05$; Chi-square test). This result was observed in all months of the study, except in June and July 2011 when we found only females. The individual body size of the two subspecies showed similar values (3.515 ± 0.287 for *H. erato phyllis* and 3.543 ± 0.424 for *H. ethilla narcaea* with $t=-0.407$, $P=0.685$; Student's t-test). Likewise, the size of the male and female *H. erato phyllis* was similar (3.476 ± 0.283 for males and 3.538 ± 0.297 for females, with $Z=0.799$, $P=0.428$). However, when comparing *H. ethilla narcaea* male and female sizes it showed that males were larger than females (3.629 ± 0.420 for males and 3.309 ± 0.353 for females, $t=-2.425$, $P<0.05$; Student's t-test). Monthly variation was observed in body size between individuals of *H. erato phyllis* ($F[9, 52]=5.33$, $P<0.001$) and also when compared among the same sexes, males ($F[8, 12]=4.011$, $P<0.05$) and females ($F[9, 31]=3.732$, $P<0.05$). In *H. ethilla narcaea* population, the seasonal variation of the wing size of the individuals was not detected ($F[8, 33]=1.451$, $P=0.213$) nor for the size of the female wings ($F[5, 5]=0.665$, $P=0.667$), but there was variation in male sizes ($F[6, 24]=3.890$, $P<0.05$). In *H. erato phyllis* population, out of 62 individuals which were captured and marked, only 11 were recaptured (17.74%), three being female. However in *H. ethilla narcaea*, of the 43 individuals captured and marked only ten individuals were recaptured (23.2%), and also only three were females. The maximum period of residence in *H. ethilla narcaea* was 52 days for females and 71 for males and for *H. erato phyllis* the maximum period was 61 days for females and 84 days for males.

DISCUSSÃO

Our results corroborate the other studies on the population biology of *Heliconius* (Rodrigues and Moreira, 2004). It is known that insects that live in tropical regions with well-defined dry and rainy seasons face significant seasonal changes in abundances, especially in areas where the dry season is very pronounced, it may reflect on significant decrease in their numbers and influence the body size. The annual abundance variation for the two butterfly subspecies of the present study seems to agree with this tropical pattern. These changes can occur in response to a number of factors, such as macro or micro-climatic changes, important determinants of the reproduction and survival conditions of individuals, as well as temporal variation of their food resources (Elpino-Campos, 2012). Thus, the knowledge on seasonal fluctuation of the insect populations represents an important step to understanding about their interspecific interactions and also about conditions of environmental.

CONCLUSÃO

The results of this study demonstrated that populations of *H. erato phyllis* and *H. ethilla narcaea* exhibit similar population size, but distinct properties and seasonal variations.

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Agradecimento

This study was financially supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) (D. Lange: AT/500868/2010-7) and Coordenação de Aperfeiçoamento Pessoal de Nível Superior (CAPES) (V. Stefani: PNPd: 2556/2011).