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Helionothrips errans (Thysanoptera: Thripidae): a new threat to native orchids in Brazil

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Orchidaceae (Asparagales) is one of the largest families of flowering plants (Yew & Hew 2000), and Brazil stands out for its richness of orchids with over 2,500 recorded species (Barros et al. 2015), about 170 of which are considered endangered (Neto et al. 2013). The reintroduction of orchids propagated from seeds in vitro into forest remnants is an important tool for conservation of such threatened species (Rubluo et al. 1993; Decruse et al. 2003). One of these species, *Cattleya intermedia* Graham ex Hook., is an epiphytic orchid now endangered (Neto et al. 2013; Rio Grande do Sul 2014) due to loss of the Atlantic Forest and predatory extraction (Brustulin & Schmitt 2008; Fundação SOS Mata Atlântica & INPE 2014). Recently, a reintroduction project of this species was begun in southern Brazil. In this project, *C. intermedia* plantlets were propagated in vitro and reintroduced to the edges and interior of forest fragments to determine if there are differences in plantlet establishment under different climatic conditions (Endres Júnior et al. 2015).

Damage on the leaves of *C. intermedia* and in some cases death of individual plantlets caused by *Helionothrips errans* (Williams) (Thysanoptera: Thripidae) (Figs. 1–4) was observed in the monitored plantlets. *Helionothrips errans* feeds and reproduces exclusively on the leaves of Orchidaceae, and has been recorded in Australia, USA, Europe, and southwestern Asia, from where it possibly originated (Mound et al. 2012). Our objectives were to provide the first record of this thrips species from the Neotropics, and to present biological information of this pest and its effects on *C. intermedia*.

The infested *C. intermedia* plantlets were studied in a forest fragment at Campo Bom County, Rio Grande do Sul, Brazil (29.668333°S, 50.009722°W). We introduced 64 and 55 plantlets at the edge of and within the forest fragment, respectively. Monthly inspections for the presence of *H. errans* were started 18 mo after reintroduction of *C. intermedia* individuals and lasted from May 2013 to Apr 2014. Furthermore, to assess the extent of damage caused by thrips feeding, all plantlets at the edge were evaluated during monitoring for the 3 parameters (P) height of the aerial portion, number of leaves per plantlet, and number of roots attached to the host plant (phorophyte) per plantlet. The relative increase or decrease in each parameter was calculated using the formula $[(P2 - P1) / P1] \cdot 100$, where P1 is the value of the parameter at the start of monitoring and P2 the value at the end of monitoring. Mann–Whitney tests were performed to detect differences between attacked and non-attacked plants, because the data did not conform to the assumptions of normality tested by the Shapiro–Wilk test with 5% of probability. Thrips specimens were mounted on slides using Canada balsam and were deposited at the Universidade Federal do Rio Grande do Sul (Porto Alegre, Brazil).

Except during Aug 2013 and Jan 2014, *H. errans* individuals were found on *C. intermedia* plantlets throughout the entire observation period. The numbers of thrips ranged from 1 to 10 individuals per plantlet, including adult and immature stages, and were found always on the undersides of the orchid leaves. *Helionothrips errans* was present in about 22.0% of the *C. intermedia* plantlets reintroduced at the edge of the forest fragment, but in only 1.8% of the plantlets inside the forest.

Plantlets attacked by thrips showed leaf damage and even complete defoliation. Damage is caused by removal of the contents of epidermal and adjacent plant cells, which causes the most severely damaged leaves to fall (Gillespie 2008). Over the 18 mo study, we found significant differences between attacked and non-attacked plants in the height of the aerial portion ($U = 71.0, P = 0.0001$) and the number of leaves ($U = 148.5, P = 0.002$) (Fig. 5). In infested plantlets, the height of the aerial portion was reduced due to leaf fall by 32.6%, and the mean number of leaves per plantlet was reduced in 37.7% of plantlets. Conversely, non-attacked plantlets showed a 29.2% mean increase in height of the aerial portion, and the mean number of leaves per plantlet increased in 19.0% of the plantlets. Reduced size of the aerial portions of infested plants might hinder the development and attachment of roots to the phorophyte compared with plants that had not been attacked (mean increase of 0.07 and 0.46 roots attached to the phorophyte per attacked and non-attacked plantlets, respectively). However, this difference was not statistically significant (Fig. 5).

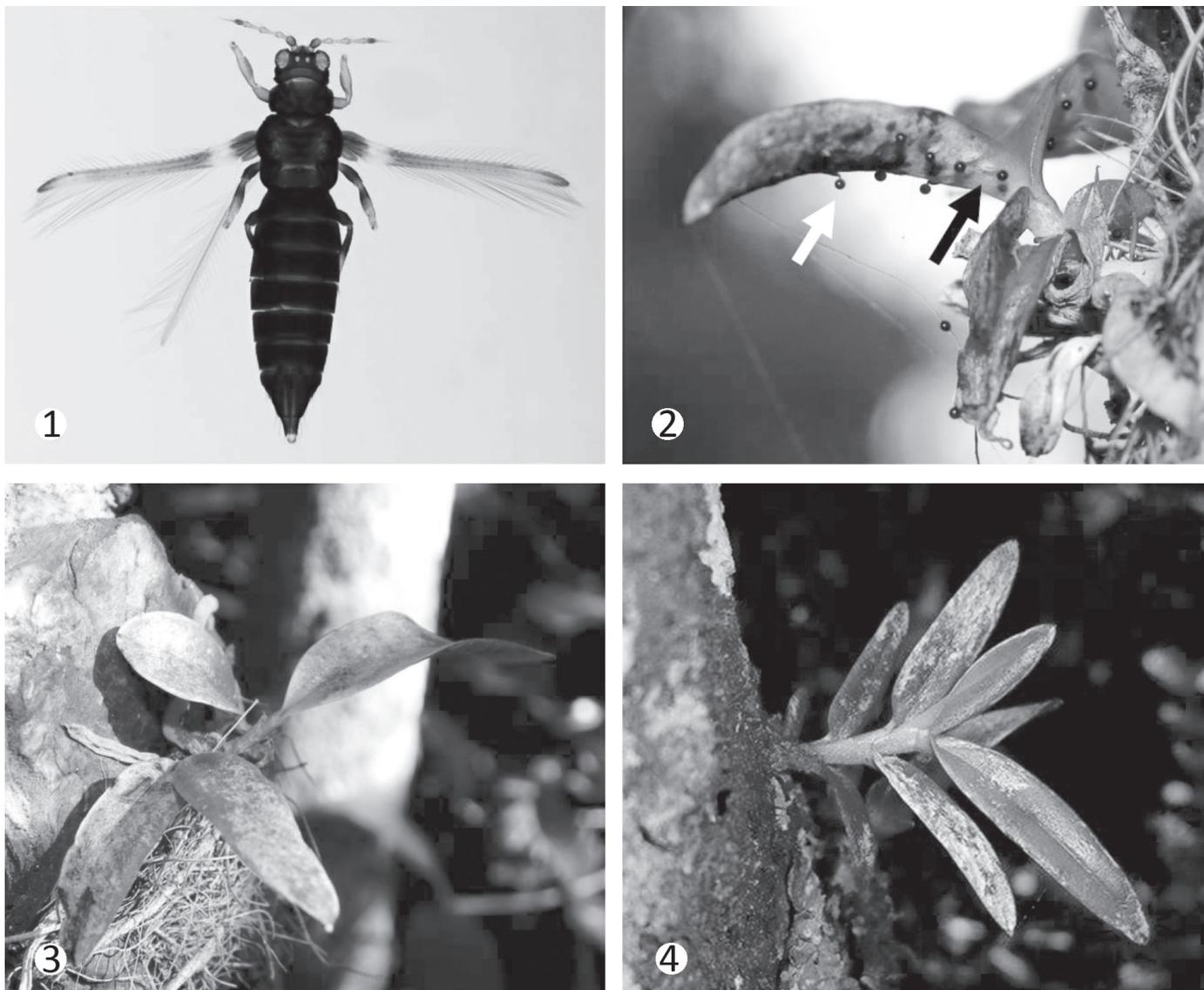
Herbivores can be destructive to orchids when they occur in large numbers or when plants are stressed by some sort of environmental change (Swezey 1945; Laštůvka 2009). The results of this study showed that reintroduced plantlets were especially vulnerable to thrips attack in the forest edge environment, which is known to exhibit severe climatic fluctuations, which possibly caused increased stress to the reintroduced *C. intermedia* plantlets.

Helionothrips errans is a generalist on orchids, recorded from *Cymbidium* Sw., *Cattleya* Lindl., *Dendrobium* Sw., *Dockrillia* Brieger, *Sarcochilus* R. Br., and *Bulbophyllum* Thouars, and from orchids grown in glasshouses in the USA and Europe (Gillespie 2008). However, this thrips seems to prefer rapidly growing individuals, such as reintroduced plantlets, and can hinder efforts to reintroduce endangered species. *Helionothrips errans* adults and larvae also were observed causing chlorosis on the leaves of the native *Epidendrum strobiliferum* Rchb.f. at the edge of the forest fragment in the study area. These findings suggest that *H. errans* is well established in southern Brazil and that reintroduction programs will require additional steps to mitigate the impact of this pest on propagated orchid plantlets.

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Figs. 1–4. *Helionohiprips errans*, *Cattleya intermedia*, and *Epidendrum strobiliferum*. (1) Female of *H. errans*; (2) larvae of *H. errans* on a *C. intermedia* plantlet leaf; (3) *C. intermedia* plantlet with chlorotic discoloration; (4) *E. strobiliferum* plantlet with chlorotic discoloration.

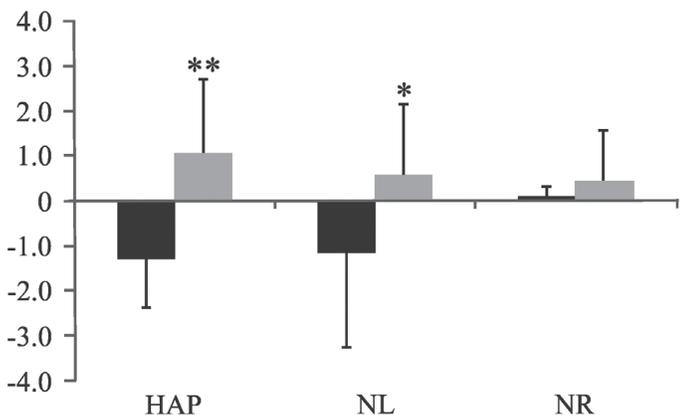


Fig. 5. Increase or reduction in height of the aerial portion (HAP in cm), number of leaves per plantlet (NL), and number of roots attached to the phorophyte per plantlet (NR) for plantlets at the edge of the forest fragment. Black and gray bars indicate plantlets that were infested and not infested by thrips, respectively. * indicates $P < 0.05$ and ** indicates $P < 0.001$, according to the Mann–Whitney test ($P = 0.05$).

Summary

Helionohiprips errans (Williams) (Thysanoptera: Thripidae) is reported for the first time in the Neotropics. This thrips breeds exclusively on Orchidaceae (Asparagales) leaves and has previously been found in Australia, USA, Europe, and southwestern Asia. We observed *H. errans* damaging the leaves of reintroduced *Cattleya intermedia* Graham ex Hook. plantlets, and attacked individuals showed reduction in the height of the aerial portion and in the average number of leaves per individual.

Key Words: reintroduction; leaf damage; Orchidaceae; *Cymbidium*; thrips

Sumário

Helionohiprips errans (Williams) (Thysanoptera: Thripidae) é registrado pela primeira vez para os Neotrópicos. A espécie se alimenta exclusivamente em folhas de Orchidaceae (Asparagales) e já foi encon-

trada para Austrália, EUA, Europa e sudoeste asiático. Nós observamos *H. errans* danificando folhas de plântulas reintroduzidas de *Cattleya intermedia* Graham ex Hook. e indivíduos atacados mostraram uma redução na altura da porção aérea e no número de folhas por indivíduo.

Palavras Chave: reintrodução; danos foliares; Orchidaceae; *Cymbidium*; tripses

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