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Notes and Comments

Oncideres saga (Dalman, 1823) (Coleoptera: Cerambycidae) girdling and developing in *Plathymenia reticulata* Benth. (Fabaceae)

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1. Introduction

Plathymenia reticulata Benth. (Fabaceae), native from South America, is used for energy and wood production, on degraded areas recovery programs, and beekeeping (Carvalho, 2009). Insect damage may reduce tree growth and survival (Knight et al., 2013; Tiberi et al., 2016) and impact their use.

Oncideres (Coleoptera: Cerambycidae) beetles girdle branches and tree trunks (Calderón-Cortés et al., 2011; Lemes et al., 2014c), to lay their eggs (Lemes et al., 2013; Paulino Neto et al., 2006). The girdling reduces the sap flow, accumulating nutrients for the insect offspring's development (Forcella, 1982), but, also, changes the trees architecture and its fruit production (Calderón-Cortés et al., 2016). Immatures develop into adults inside the girdled branch (Paulino Neto et al., 2006) with many other species that cohabit and depend on the girdled branches (Lemes et al., 2015).

Oncideres saga (Dalman, 1823) (Coleoptera: Cerambycidae), a neotropical twig girdler beetle (Monné, 2020), is a pest of urban forestry (Peres Filho et al., 1992), and forest plantations (Magistrali et al., 2013; Cordeiro et al., 2019). Susceptible host trees, near these plantations, may become an infestation focus for this beetle.

The objective was to report, for the first time, *O. saga* girdling *P. reticulata* and to characterize its biology and damage to this host.

2. Material and Methods

A trunk of a *P. reticulata* tree, recently girdled, was found on May 9, 2018, near an *Acacia mangium* Willd. (Fabaceae) plantation in Coimbra, Minas Gerais, Brazil (20º50'25" S, 42º52'30" O, 720 m). We measured the diameter and length of the girdled trunk, and the height of the girdling site on the damaged tree. The trunk was transported to the laboratory and stored in a PVC tube, covered with a plastic jar with thin holes for airflow. We moistened the trunk once a month until the adult beetles emerged. The emerged adults were pinned, labeled, and sent to Dr. Antonio Santos Silva, who identified them as *O. saga* and deposited it in the museum (MZUSP, São Paulo, Brazil).

The oviposition scars, made in the *P. reticulata* bark by the *O. saga* female, were counted along the girdled trunk. After one month, 20 of them were opened to count the number of eggs or larvae per scar and the larvae hatching percentage. The diameter of the major and minor axis of the first five adult beetle exit holes were measured in November 2018, when the first five adults emerged. After that, the whole trunk was dissected and examined. The length and the larger width of the *O. saga* pupal chambers were measured. Individuals, at different life stages, were counted inside the branch. Larval galleries were not measured because they overlapped each other. The measures were represented by mean ± SE and minimum and maximum values.

We carried out three surveys in the place where the trunk was collected to check the consequences of the girdling to the tree. The first was in May 16, 2018 (Figure 1b), the second in July 19, 2018, and the last in June 8, 2019 (Figure 1c). The tree survival and the lateral branches' development were evaluated.

3. Results

The girdled trunk (Figure 1a) had 5.42 cm in diameter, 3.52 m long, and was girdled by the insect at 1.28 m above ground. A total of 374 oviposition scars were made by *O. saga* in this girdled trunk. Five eggs and 15 larvae of *O. saga* were found in the 20 opened oviposition scars, with only one egg or larva each. Twenty-nine live *O. saga* individuals (11 larvae, four pupae, and 14 adults) were removed from the *P. reticulata* girdled trunk, six months and 13 days

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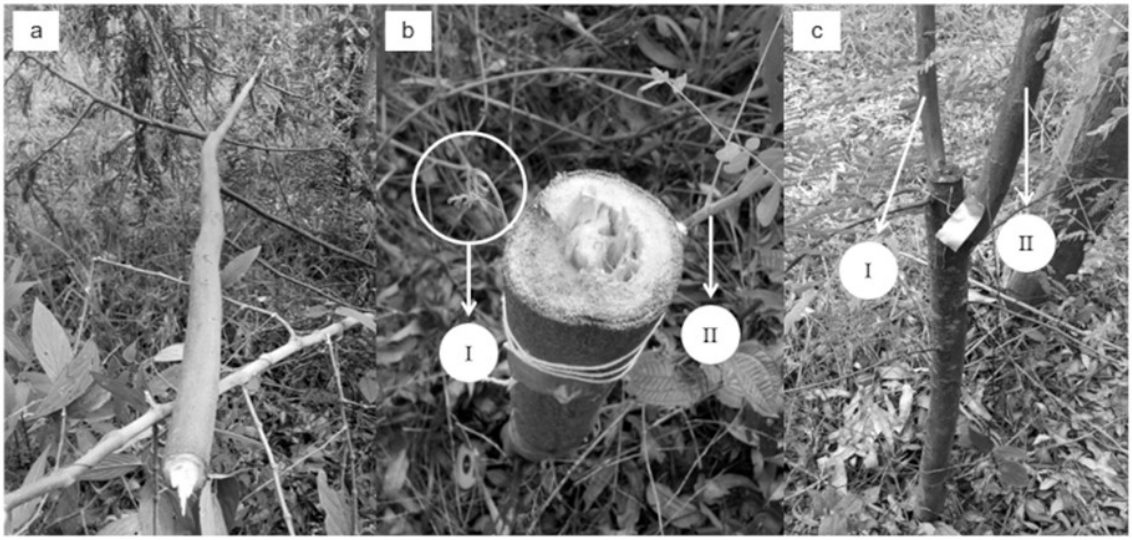

Figure 1. *Plathymenia reticulata* Benth. (Fabaceae) trunk girdled by *Oncideres saga* (Dalman, 1823) (Coleoptera: Cerambycidae) (a); and the rest of the tree, with the development of two lateral sprouts (I and II) one week (b); thirteen months after the girdling (c).

after its collection. The shape of the *O. saga* exit holes in the *P. reticulata* trunk is elliptical, with 1.24 ± 0.1 cm (1.0 to 1.6 cm; n= 5) and 1 ± 0.11 cm (0.8 to 1.4 cm; n= 5) in the major and minor axis. The *O. saga* pupal chamber in *P. reticulata* is elliptical and elongated, measuring 6.8 ± 0.58 cm long (5.2 to 8 cm; n= 4) by 2.5 ± 0.17 cm wide (2 to 2.8 cm; n= 4). Its interior was kept clean with sawdust and excrements accumulated on its sides. The tree survived from the girdling and developed two main lateral branches, below where the trunk was girdled.

4. Discussion

The total of 374 oviposition scars by *O. saga* in the *P. reticulata* trunk exceeds the average (and the greatest recorded value) on *Acacia mearnsii* De Wild. (295.7) (Magistrali et al., 2013) and on any other host of this twig girdler (Paro et al., 2014). The greater number of oviposition scars may be due to the large diameter and length of *P. reticulata* trunk, with more space for oviposition (Lemes et al., 2014a). However, factors such as nutritional quality, may also be relevant for oviposition by this beetle. The one egg (or hatched larva) per oviposition scar in *P. reticulata* was similar to that reported for *O. saga* in *Inga edulis* Mart. (Fabaceae) (Corrêa et al., 2024). Laying only one egg per oviposition scar may be a strategy to reduce intraspecific competition for space and food (Hanks et al., 1991; Lemes et al., 2013).

The total of 29 individuals of *O. saga* in different life stages in the *P. reticulata* trunk shows that the development period varies by individual of this insect. This behavior can increase the genetic variability in the population by reducing the reproduction between individuals of the same offspring (Lloyd, 1980). The low number of well-developed individuals (larvae, pupae, and adults) compared to the 75% egg viability indicates high mortality in *O. saga* immature stages, maybe due to the action of natural enemies (Lemes et al., 2014b). Although, the number was still greater than that reported in *Sclerolobium* sp. (n= 23 individuals) (Corrêa et al., 2019) and *Stryphnodendron adstringens* (Mart.) Coville (Fabaceae) (n= 6 individuals) (Soares et al., 2022).

The shape of the *O. saga* exit holes in *P. reticulata* is similar, but its dimensions in *P. reticulata* is bigger than those in *Parapiptadenia rigida* (Benth.) Brenan (Fabaceae) (1.04 and 0.85 cm) and *S. adstringens* (0.71 ± 0.45 and 0.35 ± 0.20 cm) (Link et al., 1994; Soares et al., 2022). A bigger trunk provides more food for insect development (Lemes et al., 2014a; Seaton et al., 2020) and, so, larger adults emerge (Hanks et al., 2005), which leave wider holes (Ciach and Michalcewicz, 2013; Sánchez and Keena, 2013). The dimension of *O. saga* pupal chamber is the first for a twig girdler beetle.

The *P. reticulata* tree survived the girdling, but its crown architecture changed, growing two lateral branches from the trunk. The side branches development was similar to the reported in *Spondias purpurea* L. after girdling of *Oncideres albomarginata chamela* Chemsak & Giesbert, 1986 (Col.: Cerambycidae), which had 50% more side branches developed in girdled branches than in non-girdled ones (Calderón-Cortés et al., 2016).

This is the first report of *O. saga* using *P. reticulata* as a host. The large number of oviposition scars and individuals of *O. saga* indicates that *P. reticulata* is a suitable host and may serve as a reproductive refuge and, therefore, should be inspected near to forest plantations in integrated management programs.

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