New host plant for *Atractomerus pitangae* Marshall (1925) in Brazil

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**ARTICLE INFO**

**Abstract**

**Background:** Collection and processing of fruits for a seed lot formation are common practices that ensure perpetuation of native tree species. Seeds collected must have good physical, physiological, genetic, and sanitary quality, besides having ideal storage condition. Thus, seeds can germinate and form healthy seedlings. Crescent demand for seeds has led to a significant increase in distribution and transport of genetic material between regions. Presence of insects in seed lots is an indication that collected material may be infected. Fruits of Myrtaceae family (native species) are used mainly for recovery of degraded areas, wood, and landscape purposes. Seed predation by insects negatively affect the use of these seeds for all these purposes. **Objective:** This study aimed to report the occurrence of *Atractomerus pitangae* (Coleoptera: Curculionidae) preying on a new host plant *Eugenia involucrata* in Brazil. **Results:** The occurrence of *A. pitangae* was detected in a seed lot of *E. involucrata* from São Miguel do Oeste city, Santa Catarina state, Brazil. Predation by larvae stages affected the length and weight of the seeds of *E. involucrata* because the endosperm was consumed and induced changes in these parameters. **Conclusion:** In conclusion, this predation may reduce germination and vigor of seeds defeating perpetuation and dispersion of this host plant. Studies regarding conservation and management of seed lots are important to maintain the quality of seeds. Thus, ensuring high germination and high vigor levels will produce healthy seedlings.

**INTRODUCTION**

The understanding of insect behavior and their damage, especially in fruit of native trees, is important to manage silvicultural activities, maximize production, and enable a high degree of seed germination. Seeds are fundamentals because ensure permanence and dispersion of species on environment (Rodrigues, 2013). Also, seeds produce healthy and productive seedling in forest nurseries, in which case, aspects such as physical, physiological, sanitary and genetic quality must be taken into account (Vechiato and Parisi, 2013). Healthy seeds in a seed lot enable a better new plant population development that guarantees species perpetuation, since native forest seedlings are used for trade market, recovery of degraded areas, and reforestation (Dorneles, 2014).

*Eugenia involucrata* DC. (Myrtaceae) is distributed on south and southwest of Brazil and is commonly known as cherry of rio grande, cerejeira-do-mato, cerejeira-da-terra, pitanga-preta, aracazeiro or cherry tree (Carvalho, 2008). It has characteristics that permit to use for several purposes such as: timber, landscaping, and reforestation of degraded forest areas (Loreni, 2008). But, its potential use still few explored (Golle *et al*., 2012). Leaves are used for tea production in order to prevent diarrhea and digestive problems (Sausen *et al*., 2009). The fruit ripening is driven per many morphological, physiological and functional changes, which ones
have influence on seed quality (Avila et al., 2009). When fruit is ripe seeds are more susceptible to predation (Begon et al., 2007). Demand for trade seeds and for recomposition of vegetal cover increased distribution and transport of genetic material between regions. Consequently, it raises phytosanitary problems when fungi or insects are present, such as a reduced vigor of seed lots (Vechiato e Parisi, 2013).

No records have so far been found in literature about Curculionidae (Coleoptera) family damaging seeds of *E. involucrata* in Brazil. Insects reported to be the most harmful to *E. involucrata* are: scales, which cause injuries generally in nursery plants (Carvalho, 2009); leafcutter ants and fruit flies (Lisbôa et al. 2011); two species of *Neosilba* (Diptera: Lonchacidae) have also been recorded hosting fruits of *E. involucrata* identified as *Neosilba pendula* Bezzi (1919) and *Neosilba zullichia* McAlpine and Steyskal (1982) (Gisloti et al., 2017). In this context, this study reports seed predation of a new host plant, *E. involucrata*, by *Atractomerus pitangae* Marshall (1925) (Coleoptera: Curculionidae) in Brazil.

Occurrence of *A. pitangae* feeding on seeds of *E. involucrata* was detected in a seed lot produced at the region of São Miguel do Oeste, in Santa Catarina state. The seed lot was sent to the project of Bolsa de Sementes developed by Associação de Fumicultores do Brasil and Forestry Nursery at Federal University of Santa Maria, Rio Grande do Sul. Seeds (250) were randomly picked from the lot and individualized in clear plastic containers measuring 12.5 cm long, 8.0 cm wide and 2.0 cm high, containing 12 cells of 2.5 cm of diameter. All containers were covered with lids to avoid the escape of adult insects after emergence. Containers were kept in a room with 20±5°C. The experiment started on October 8, 2016 and the evaluations of adult emergence were performed every 15 days in a period of 4 months. All seeds were measured in length, width, and weight. Adult specimens were stored in vappdoors of 1.5ml with alcohol 70%. Subsequently, specimens were sent to Department of Zoology at University of São Paulo (USP) for identification by a taxonomy specialist. Data were analyzed with the software Statistical Analysis System (SAS) version 8.0 (SAS Institute, 1999). Tukey-Kramer mean test was performed to verify the predation effect on length, width, and weight of seeds in three types of classification with a significance level of *P < 0.05*.

A number of 37 adults of Coleoptera order and Curculionidae family emerged. Furthermore, 61 curculioniform larvae were found dead inside the seeds partially consumed. From a total of 250 seeds, 15 seeds were totally consumed by *A. pitangae* and prevented such measurements. Thus, a total of 235 seeds were used for the assessments being each seed classified into three damage categories (Figure 1): A- no visible damage (63.8%); B- partially consumed (26.4%); and C- severely consumed (9.8%).

The specimens were identified as *Atractomerus pitangae* Marshall (1925) (Coleoptera: Curculionidae, Curculioniniae) (Figure 2), according to dissection of male genital and comparison with descriptions and illustrations from Clark (1989). Vouchers of adults were deposited at Zoology Museum of USP. This species had different synonymies (Clark, 1989) such as *Anthonomus bruchi* Hustache (1939) and *Anthonomus obliquatus* Hustache (1940).

According to Clark (1989), *A. pitangae* occurs in Argentina at provinces of Buenos Aires and Entre Rios; in Brazil at states of Rio Grande do Norte, Espirito Santo, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Rio de Janeiro, São Paulo, Santa Catarina, and Rio Grande do Sul; and Colombia. Adults and larvae of *A. pitangae* were detected in Brazil preying seeds of *Eugenia uniflora* (Myrtaceae) (Clark, 1989; Antunes et al., 2012; Dorneles, 2014). Larvae of *A. pitangae* were reported feeding on seeds of *E. uniflora* in Santa Maria, Rio Grande do Sul state, which occurred during all seed development stage with a major preference for seed with orange and red colors (Dorneles, 2014). Its occurrence is related to development stages of seeds and fruits. Probably, the fruits and seeds from this study were collected in the same stage as *E. uniflora* (Dorneles, 2014), because were found many larvae in the seed lot from São Miguel do Oeste.

Curculionidae family is the most numerous from the Animalia kingdom being composed of phytophagous insects (Gallo et al., 2002). Because larvae can develop in several environments they may also be seed feeders, depending of species (Oberprieller et al., 2007). Furthermore, Curculionidae is considered a primary pest resulting in high economic damages mainly in stored grains (Pereira and Salvadori, 2006). In terms of forestry species, Curculionidae larvae cause damage in many species of Fabaceae, Combretaceae, Malvaceae (Rodrigues, 2013), Lauraceae (Cuanahua, 2010) and, Myrtaceae (Acevedo and Arenas, 2013).

Statistical reference parameters were calculated according to length, width, and weight of seeds from the seed lot available (Table 1). It was observed that the length of *E. involucrata* seeds varied significantly between categories A and C, being similar between categories A and B regarding the significance level *P < 0.05*. For the variable width of seeds, there was no statistical difference for these three analyzed categories. Statistical differences were observed for the three categories regarding seed weight, being the higher value an average of 0.241g for category A, followed by category B with 0.194g, and 0.123g for category C. Thus, seed predation by *A. pitangae* has mainly effected length and weight of seeds in *E. involucrata*. These results may be due to the way in which the larvae feeds on seed endosperm, which leads to alterations in these parameters. Seeds with approximately 0.75cm long and 0.7cm wide (Carvalho, 2009), are recalcitrant and intolerant to long storage periods (Lisbôa et al., 2011).
It has been reported about fruits and seeds that as much more long, thick, wide, and high, leads to more attractiveness and consequently predation rate due to the greater amount of resources available (Consolaro and Guarino, 2003). Seed predation by insects is complex and when happens in high intensity prevents seed germination, leading to reduction of host plant perpetuation. For this reason, conservation of native seed lots should be carefully evaluated in order to achieve maximum quality.

In conclusion, this study reports a new host plant of *A. pitangae* in Brazil feeding on seeds of *E. involucrata*. Thus, for future directions, it has to be performed more studies regarding biological parameters of this pest, germination tests to see how intensive is the damage, and to find other potential host species of Myrtaceae family. Furthermore, do some experiments in how the exudates and odors characteristics of the genus *Eugenia* can influence the attractiveness and predation of this insect.

Fig. 1: Classification of seeds into three damage categories: no visible damage (A), partially consumed (B) and severely consumed (C).

Fig. 2: Adult of *Atractomerus pitangae* (Marshall, 1925).
**Table 1: Characteristics of seeds of *E. involucrata* infested with *A. pitangae***

<table>
<thead>
<tr>
<th>Variables</th>
<th>Classification of damage</th>
<th>N</th>
<th>Damage (%)</th>
<th>Minimum</th>
<th>Mean</th>
<th>Maximum</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (cm)</td>
<td>No visible damage</td>
<td>150</td>
<td>63.8</td>
<td>0.450</td>
<td>0.842</td>
<td>a</td>
<td>1.100</td>
</tr>
<tr>
<td></td>
<td>Partially consumed</td>
<td>62</td>
<td>26.4</td>
<td>0.600</td>
<td>0.819</td>
<td>a</td>
<td>1.100</td>
</tr>
<tr>
<td></td>
<td>Severely consumed</td>
<td>23</td>
<td>9.8</td>
<td>0.500</td>
<td>0.743</td>
<td>b</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>235</td>
<td>100.0</td>
<td>0.450</td>
<td>0.827</td>
<td></td>
<td>1.100</td>
</tr>
<tr>
<td>Width (cm)</td>
<td>No visible damage</td>
<td>150</td>
<td>63.8</td>
<td>0.400</td>
<td>0.723</td>
<td>a</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Partially consumed</td>
<td>62</td>
<td>26.4</td>
<td>0.600</td>
<td>0.718</td>
<td>a</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Severely consumed</td>
<td>23</td>
<td>9.8</td>
<td>0.500</td>
<td>0.670</td>
<td>a</td>
<td>0.900</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>235</td>
<td>100.0</td>
<td>0.400</td>
<td>0.716</td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>Weight (g)</td>
<td>No visible damage</td>
<td>150</td>
<td>63.8</td>
<td>0.070</td>
<td>0.241</td>
<td>a</td>
<td>0.700</td>
</tr>
<tr>
<td></td>
<td>Partially consumed</td>
<td>62</td>
<td>26.4</td>
<td>0.100</td>
<td>0.194</td>
<td>b</td>
<td>0.410</td>
</tr>
<tr>
<td></td>
<td>Severely consumed</td>
<td>23</td>
<td>9.8</td>
<td>0.050</td>
<td>0.123</td>
<td>c</td>
<td>0.220</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>235</td>
<td>100.0</td>
<td>0.050</td>
<td>0.217</td>
<td></td>
<td>0.700</td>
</tr>
</tbody>
</table>

Where: n = number of seeds; According to Carvalho (2009) *E. involucrata* presents the following characteristics as seed: minimum and maximum length 0.50-1.00cm and minimum and maximum width 0.60-0.80cm. *Means followed by different letter in column, according to each variable, differ from each other by Tukey-Kramer test (p<0.05).  

**ACKNOWLEDGMENTS**

To Prof. Dr. Sergio Antonio Vanin (Bioscience Institute of University of São Paulo) who identified the specimens of this research as *Atractomerus pitangae*.

**REFERENCES**


