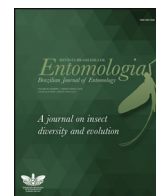




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Short Communication

Specialized diet of the solitary bee *Epicharis rustica* (Apoidea, Centridini): importance of the tree *Byrsonima sericea*



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ABSTRACT

Collection of pollen was verified in 248 samples of the material on the hind tibial scopae of the solitary bee, *Epicharis rustica* (Olivier, 1879) captured on their return to the nest. Of the total, 54% (133) of the samples had material on the scopae, 48 of them had only oil and 85 (64%) had both oil and pollen. For seven weeks, almost all (91%) of the 85,000 the pollen grains were of the tree, *Byrsonima sericea* DC. In the latter weeks the proportion of this species decreased. Like several other members of the genus, *E. rustica* is univoltine, oligolectic and nests in aggregations.

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It is well known that certain species of flowers produce oils on the sepals, which are collected by specialist bees (Raw, 1979; Neff and Simpson, 1981; Buchmann, 1987; O'Toole and Raw, 1991; Michener, 2000). The bees provision their cells with the oil as food for the young instead of nectar (Vinson et al., 1997). The relationships between the plants that produce the oils and the bees that collect them are still scarce and little is known of the importance of the plants in the diets of the bees (see Gaglianone, 2005; Werneck et al., 2015 for data on *Epicharis*). In this study, we examined pollen removed from bees to assess the frequency of the types of pollen which *Epicharis rustica* (Olivier, 1879) collected to provision their cells.

An aggregation was found of 40 active nests of *E. rustica* in a north-facing, clay bank next to the Ilhéus-Itabuna highway (14°48'3.06" S, 29°4'1.45" W). The area occupied by bees was about 3 m wide by 1 m high. There was very little erosion, but it was sufficient to keep the surface bare and free from vegetation and near vertical.

In previous years, it had been noted that the flowering of *Byrsonima sericea* DC began during the second or third week of December and continued into February so samples of food were collected weekly for 10 weeks between December 23, 2003 and March 6, 2004. Bees were captured on their return to their nests during the morning time (8 am–12 pm) and released after removal of the material on the hind tibial scopae of each bee. The material

was placed directly onto a microscope slide and covered with a cover-slip. Only one slide was made for each bee. The material was dyed with basic fuchsin and pollen grains identified through comparison with previously prepared slides with the pollen of the species of plants that flowered around the nesting area (up to ~300 m). One thousand pollen grains were examined in each sample.

During ten weeks bees were captured 248 times in flight as they returned to the nest. The bees were not marked so it is not known how many individuals were involved. The number collected per day ranged from 10 to 50. Of the total 248 samples, we observed in the field that 54% (133) were carrying material on the scopae (Table 1). The proportion of samples with bees carrying material ranged from 30% to 65% per week. Of these 133 samples, 48 had only oil and 85 (64%) had both oil and pollen.

Almost all (91%) of the 85,000 pollen grains examined were of *B. sericea*. The remainder belonged to various other species of which the tree *Clitoria racemosa* Benth. comprised 1%. The closest tree of *B. sericea* was 120 m from the nest site. During the first seven weeks (23 December to 11 February), the percentage of pollen of *B. sericea* in every sample was greater than 98%, but decreased to 73% in 20 February, 69% on 27 February and 64% on 6 March (Table 1), when we observed an increase in the number of pollen of *C. racemosa* (less than 1%) and other unidentified plants (almost 36%). In every week but one (5 February), some bees (13% to 70%) were captured bearing only oil. These comprised one-fifth (48 of 248) of the total samples taken. There were heavy showers on several days during the later weeks (5 and 22 February and 6 March) and fewer bees were collected.

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Table 1
Contents of samples removed from 248 foraging females of *Epicharis rustica* on their return to the nest during 11 weeks.

Date of collection	Number of bees captured	Number of bees with material on the scopae	Number of bees with only oil	Number of bees with pollen and oil	% of pollen of <i>Byrsonima sericea</i> in samples with pollen
23 December	27	15	5	10	98.8
30 December	50	15	4	11	99.7
6 January	24	15	2	13	99.1
13 January	23	15	8	7	100
22 January	26	15	4	11	99.7
27 January	24	15	3	12	99.7
5 February	10	6	0	6	100
11 February	18	11	8	3	99.5
20 February	11	6	4	2	73.2
27 February	18	10	5	5	69
6 March	17	10	5	5	64.2
Total	248	133	48	85	91.2

Like various congeners, *E. rustica* is univoltine (pers. obs.) and the adult females visit the flowers of *Byrsonima* (Roubik and Michener, 1980; Raw, 1992; Hiller and Wittmann, 1994; Gaglianone, 2005). The oligolectic behavior of other Centridini species has been demonstrated in previous works (Gaglianone, 2005; Gonçalves et al., 2012). However, the present study shows the activities of individual females of *E. rustica* when collecting pollen and oils. During seven weeks, almost all the pollen collected was of *B. sericea*. The bees collected a smaller proportion of that pollen in the later weeks of their nesting period, which was also toward the end of the trees' flowering period. The trees bore fewer flowers and it is likely that the bees were forced to visit flowers of other species.

On several foraging trips, the bees collected only oil. Presumably, pollen was available and we surmise that the collection of oil without pollen was the bees' decision related to the phase of nest and cell construction. Nearly half the returning bees brought no pollen or oil, but on the same days, others returned with food on the hind tibial scopae. This shows that pollen and oil were available which leads us to suggest that on some journeys the bees sought food (nectar) for themselves rather than to provision the nest.

E. rustica is typical of the larger species of the genus (Raw, 1992; Gaglianone, 2005; Thiele and Inouye, 2007), being univoltine (having only one generation per year), oligolectic [restricting the collection of pollen to a few species of plants (O'Toole and Raw, 1991)] and nesting in large aggregations.

Conflicts of interest

The authors declare no conflicts of interest.

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