

SCIENTIFIC NOTE

Herbivory on Bracken (*Pteridium* spp.) by *Bolax palliata* Burmeister (Coleoptera: Scarabaeidae), a Poliphagous Beetle of the Venezuelan AndesJORGE L. AVILA NÚÑEZ¹, L. DANIEL OTERO², MARLENE NAYA¹ AND MARIA P. CALCAGNO-PISARELLI¹¹Grupo de Química Ecológica, Depto. Química; ²Lab. Ecología de Insectos, Depto. Biología. Facultad de Ciencias, Univ. de Los Andes, Mérida 5101, Venezuela; jlavila@ula.ve*Neotropical Entomology* 37(6):741-743 (2008)Herbivoría en el Helecho Macho (*Pteridium* spp.) por *Bolax palliata* Burmeister (Coleoptera: Scarabaeidae), un Escarabajo Polífago de los Andes Venezolanos

RESUMEN - Se reporta la herbivoría de *Bolax palliata* Burmeister sobre dos especies simpátricas del helecho macho: *Pteridium caudatum* (L.) Maxon and *P. arachnoideum* (Kaulf.). Observaciones de laboratorio y campo mostraron preferencia por la última de estas especies. La información fitoquímica disponible sugiere que esta selección podría estar basada en diferencias en la concentración de taninos condensados.

PALABRAS CLAVE: Preferencia alimentaria, Rutelinae Neotropicales, Geniatini, tanino condensado

ABSTRACT - Herbivore attack by *Bolax palliata* Burmeister is reported on two sympatric bracken species: *Pteridium caudatum* (L.) Maxon and *P. arachnoideum* (Kaulf.). Laboratory and field observations revealed a preference for the last of the two species. Available phytochemical information suggests it could be based on differences in concentration of condensed tannins.

KEY WORDS: Feeding preference, Neotropical Rutelinae, Geniatini, condensed tannin

Insect herbivory on bracken has been a matter of special interest for several decades. Allegedly, its diverse secondary chemistry and other attributes explain its success as one of the world's most important weeds (Alonso-Amelot 2002). Different coleopteran herbivores have been documented in past accounts. Lawton (1976) reported frequent predation by *Phyllopertha horticola* L. (Scarabaeidae: Rutelinae) in the British Isles. Kirk (1982) reported sixteen species in the Cerambycidae, Chrysomelidae, Curculionidae and Scolytidae out of a community of thirty insect species associated with bracken in New Guinea. Gilman & Cooper-Driver (1998) report *Popilia japonica* Newman (Scarabaeidae: Rutelinae) in Vermont, U.S.A. In the Neotropics, reports of Coleoptera or other insect herbivores are rather rare. Salinas & Ortega (1990) found *Epitrix* sp. (Chrysomelidae) and unidentified scarabaeids and curculionids on *Pteridium aquilinum* (L.) Kuhn., but did not confirm herbivory. Martins *et al.* (1995) reported damage on stems by curculionids and cerambycids on the same species.

This account is the first report of a massive attack by *Bolax palliata* Burmeister (Geniatini) on fronds of *Pteridium arachnoideum* (Kaulf.), first observed by the first author on May 30th, 2007, in Cerro La Bandera at 1900 m.a.s.l., near La Hechicera, North-West of the city of Mérida, Venezuela. The Geniatini includes 327 species inhabiting the Neotropics. *Bolax* comprises 42 known species occurring from Nicaragua to Northern Brazil (Jameson & Hawkins 2005) on different

plant groups including Euphorbiaceae (*Croton* spp.), Mimosaceae (*Inga* spp.), Bombacaceae (*Bombax* spp.) and Lamiaceae (*Hyptis* spp.). Species have also been reported on cultivated fruit trees (*Prunus* sp., *Malus* sp.), on vineyards (*Vitis* spp.) and grasses (Jameson, pers. com.).

In Venezuela, *B. palliata* is considered an important pest of fruit trees, cultivated timber and natural forests (Briceño & Hernández 2004). Briceño (1989) reported intense skeletonization of *Inga* spp. trees in shaded coffee plantations, sometimes leading to complete defoliation.

Two species of bracken coexist at Cerro La Bandera: *Pteridium caudatum* (L.) Maxon and *Pteridium arachnoideum* (Kaulf.). The occurrence of large numbers of male and female *B. palliata* on the fronds of *P. arachnoideum* – aggregates of two to five individuals per frond, frequently in copula – as well as the evident signs of herbivory, suggested an obvious preference for this species over *P. caudatum*. Many pinnae in the fronds of *P. arachnoideum* showed conspicuous bites on the margins of the laminae (Fig. 1), which occasionally led to the loss of the frond's segment. Old damage showed the characteristic pattern of bites plus a dark brown necrosis of the remaining tissue. In order to confirm the use of *Pteridium* spp. as hosts by *B. palliata*, three subsequent sets of six male and six female beetles were confined in a glass cage and provided with one mature pinna of *P. caudatum* and one of *P. arachnoideum*. The presence-absence of beetles, or signs of herbivory on each of the bracken species were



Fig. 1. Couple of *B. palliata* and its characteristic damage on *P. arachnoideum*.

recorded after a period of 48h. In all trials, all individuals were recurrently found perching on *P. arachnoideum* by the end of the experiment and only the pinnae of this species had been consumed by the beetles. After copulating while on the fronds of *P. arachnoideum*, females dig shallow tunnels in the soil to oviposit. Larval development occurs underground.

In order to confirm herbivore preference for any of the two coexisting species of bracken in the field, two study lots, A ($\approx 115 \text{ m}^2$) and B ($\approx 131 \text{ m}^2$), were defined on the sole judgement that fronds of both species were growing in abundance. The study lots were visited on June 18th and 20th, 2007. In a nearly exhaustive assessment of the fronds of each species, we recorded presence/absence of *B. palliata*, and characteristic signs of herbivory. Of all fronds of both species, 90% had reached their fourth stage of development (following Alonso-Amelot *et al.* 1999) in both study lots. In study lot A, 177 of a total of 231 fronds (76.6 %) belonged to *P. caudatum*. Notwithstanding, only two fronds of this species (1.1%) as compared to 17 of the 54 fronds belonging to *P. arachnoideum* (31.5%) had *B. palliata* perching on them. Signs of herbivory were clearly greater in fronds of *P. arachnoideum* (90.7%) ($P < 0.001$, Chi-Square Test).

In study lot B, *P. arachnoideum* was dominant over *P. caudatum*. A number of 89 fronds (55.3%) against 72 (44.7%) were examined for signs of herbivory by *B. palliata*. We found no beetles at the time of our visit, but our assessment of past herbivory showed a similar overall pattern to that of lot A. Fifty fronds of *P. arachnoideum* (56.2%) had been feed upon, whilst only seven fronds of *P. caudatum* (9.7%) showed signs of *Bolax* herbivory ($P < 0.001$, Chi-Square Test).

A recent comparative analysis of the chemistry of the two bracken species (Alonso-Amelot *et al.* 2004) revealed important differences in content of condensed tannins in the fronds. Concentration in *P. arachnoideum* is nearly three times that of *P. caudatum*, suggesting a possible phytochemical base for the preference of *B. palliata* for the first of the two species. Interestingly, one more plant species

in the locality was serving as a host to *B. palliata* adults. We observed intense feeding on a young *Inga* sp. tree neighboring our study site. The aforementioned record by Briceño (1989) and this confirming observation lends additional support to our hypothesis, since some *Inga* species are known for their high contents in condensed tannins (Koptur 1985, Galindo *et al.* 1989, Myster 2002), a group of compounds commonly known as defensive, due to their alleged antinutritional properties (Balick *et al.* 1978, Tempel 1981, Forkner *et al.* 2004).

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