

SPECIES OF THE WEEVIL GENUS *SIBINIA* GERMAR, 1817 (COLEOPTERA: CURCULIONIDAE) AS BIOINDICATORS OF NATURAL SANDY HABITATS

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Abstract: Monophagous and oligophagous species of the weevil genus *Sibinia* (Coleoptera: Curculionidae), which are strictly bound to vegetation with specific habitat demands, have significant bioindicative value. During the research of two different localities in Slovakia and Hungary, we recorded altogether 8 *Sibinia* species. Two of them are bioindicators of acidic sands and were found at Slovak locality in Borská nížina lowland: *Sibinia pyr rhodactyla* (Marsham, 1802), *S. sodalis* Germar, 1824, whereas one species, *S. unicolor* (Fåhraeus, 1843), a bioindicator of alkaline sands was recorded at Hungarian locality near Gödöllő.

Key words: *Sibinia*, Curculionidae, bioindicator, sandy habitat, faunistics, Slovakia, Hungary

Abbreviations

BON – Borská nížina lowland, ERD – Erdőkertes, SK – Slovakia, ZN – Záhorská nížina lowland, HU – Hungary

INTRODUCTION

The weevil genus *Sibinia* Germar, 1817 belongs taxonomically to the tribe Tychiini (Coleoptera, Curculionidae, Curculioninae), namely to its subtribe Tychiina. All *Sibinia* species are phytophagous. In the Palaearctic region, there are currently known 68 species of *Sibinia* (CALDARA 2013). Most species (approx. 130) are found in the Neotropical region, mainly in South America, 60 species occur in the Afrotropical region, especially in South Africa (SKUHROVEC et al. 2015).

At present, the genus consists of three subgenera: *Sibinia* s. str., *Dichotychius* Bedel, 1885 and *Microtychius* Casey, 1910. Afrotropical *Sibinia* species might belong to a different, still undescribed subgenus. The above three subgenera differ among others by the shape of the spermatheca and families of their host plants. To distinguish them purely based on external morphological characters is difficult (SKUHROVEC et al. 2015). This article treats only species from subgenera occurring in the Palaearctic region: *Dichotychius* (*Sibinia sodalis* Germar, 1824) and *Sibinia* s. str. (other species).

Host plants of Palaearctic *Sibinia* s. str. are Caryophyllaceae. Afrotropical species apparently develop especially in Aizoaceae (SKUHROVEC et al. 2015). The host plants of the subgenus *Dichotychius* belong to Plumbaginaceae. Development of most *Sibinia* species takes place inside seeds, but some species of the subgenus *Microtychius* develop in flower buds (SKUHROVEC et al. 2015). BUHR (1965) reports doubtfully *S. femoralis* Germar, 1824 to be a gall inducer on *Silene otites* (L.) Wib., however, it was never confirmed later (SKUHROVEC et al. 2015). Some *Sibinia* species such as *S. sodalis*, *S. unicolor* and *S. pyrrhodactyla* are due to their strict bound or at least marked preference of psammophilous vegetation reliable indicators of original or at least close to original sandy habitats.

Aeolian sands are specific substrate for the vegetation. Sand dunes are specific habitats supporting a particular plant biodiversity, often characterized by plant species with special biological requirements. High temperatures on ground surface, big day – night temperature differences, lack of water in upper ground layers or sand movement create extreme conditions, where only some morphologically and physiologically adapted plant species – psammophytes can survive and reproduce, which represent an unique ecological group of xerothermophytes (ZALIBEROVÁ et al. 2008).

In both habitats with psammophilous flora and fauna the occurrence of mentioned sandy habitat indicators belonging to the weevil genus *Sibinia* was investigated.

MATERIAL AND METHODS

1. Sandy habitats of Borská nížina lowland (BON) – SK, collecting place: N 48°24.7' E 17°4.0', 150 m a.s.l. (Fig. 1)

Borská nížina lowland is a geomorphological unit in the western Slovakia in Záhorská nížina lowland. It is the largest sandy flat to low-hilly area in Slovakia with the dominance of pine forests. It borders with Malé Karpaty hills in the east, Myjavská pahorkatina upland in the north-west and northwards with Chvojnická pahorkatina upland and Dolnomoravský úval lowland. In the north, the river Morava separates the area from Wiener Becken lowland in Austria. In ZN sandy dunes have specific physical and chemical peculiarities. Geologically are these aeolian sands mainly quartz (up to 90 %), with small content of spar and mica. There are chemically weakly acidic to neutral: It is caused by the calcite absence in these sands (BEDRNA 2008). Typical grounds for this area are podsols which occur mainly in the geographical part of ZN called Bor (BON locality). This area is continuously forested so that dunes are stabilized and not prone to wind blowing movement (BEDRNA 2008).



Fig. 1. Locality BON (SK). Author: M. Košťál, 2015.

2. Sandy habitats in surroundings of Gödöllő Erdőkertes upland (BON) – SK, collecting place: N 47°39.9' E 19°20.5', 200 m a.s.l. (Fig. 2)

The upland in surroundings of the town Gödöllő has no clear geographical delimitation, is geomorphologically variable geographical area, which could be characterized by small scattered alkaline sandy places. In the south and east is delimited by Alföld lowland, in the north by foothills of Mátra mountains and Cserhát upland. As western border could be regarded Danube river.

Sands of Pannonian basin differ from them of Borská nížina lowland substantially. On the other hand, they are almost identical with those of southern part of Podunajská nížina lowland in Slovakia, e.g. in Chotín surroundings. These carbonated sands are much richer in minerals. Besides quartz, they contain a significant proportion of feldspar, mica and calcite (calcite up to 10 %). Weak, but important alkalinity of these sands is caused by carbonates (up to 10 % CaCO_3) (BEDRNA 2008).

We used a plant-targeted individual collecting as well as a general sweeping of a lower steppe vegetation using a standard entomological sweeping net (31 x 41 cm). Sweeping was not conducted in a quantitative way. Specimens collected were examined using stereomicroscope (Intraco Micro NSZ-810) and microphotographs were taken with high-resolution camera (Canon EOS 50D) and

macro zoom lens (Canon MP-E 65 mm). Slovakian locality was investigated by the first author several times during the summer season 2014 and spring season 2015. Collecting on Hungarian locality was performed on 13.vi.2015. In all cases in warm dry weather, with temperatures above 25 °C. Specimens collected were killed with ethyl-acetate in polyethylene vials and mounted in the usual way on paper labels for identification. Material is deposited in the first author's collection.



Fig. 2. Fig. 2: Locality ERD (HU). Author: M. Košťál, 2015.

RESULTS

Altogether, a presence of 8 species of the genus *Sibinia* (Table 1) was confirmed, 5 species on the locality in Borská nížina lowland (BON) and 5 species on the locality Erdőkertes (ERD). Species listed were caught as follows (rough quantitative data given in bioindicating species only): *Sibinia femoralis* Germar, 1824, *S. phalerata* (Gyllenhal, 1836), *S. pyrrhodactyla* (>10 ex.) (Fig. 3) – general sweeping, *S. sodalis* (>100 ex.) (Fig. 4) on *Armeria vulgaris* Willd., *S. subelliptica* (Desbrochers, 1873) on *Dianthus carthusianorum* L., *S. tibialis* (Gyllenhal, 1836) on *Silene otites* (L.) Wib., *S. unicolor* (>100 ex.) (Fig. 5) on *Gypsophila paniculata* L., *S. vittata* Germar, 1824 on *Dianthus pontederæ* A. Kern. and *Dianthus serotinus* Waldst. & Kit.

Table 1. Occurrence of species of genus *Sibinia* on localities BON and ERD (2014 & 2015).

Species		BON	ERD
<i>Sibinia</i>	<i>femoralis</i> Germar, 1824	-	+
<i>Sibinia</i>	<i>phalerata</i> (Gyllenhal, 1836)	+	-
<i>Sibinia</i>	<i>pyrrhodactyla</i> (Marsham, 1802)	+	-
<i>Sibinia</i>	<i>sodalis</i> Germar, 1824	+	-
<i>Sibinia</i>	<i>subelliptica</i> (Desbrochers, 1873)	+	+
<i>Sibinia</i>	<i>tibialis</i> (Gyllenhal, 1836)	+	+
<i>Sibinia</i>	<i>unicolor</i> (Fåhraeus, 1843)	-	+
<i>Sibinia</i>	<i>vittata</i> Germar, 1824	-	+

sandy area indicator; + species confirmed; - species unconfirmed



Fig. 3. *S. pyrrhodactyla*, Author: M. Košťál, 2015 (left).

Fig. 4. *S. sodalis*, Author: M. Košťál, 2015 (middle).

Fig. 5. *S. unicolor*, Author: M. Košťál, 2015 (right).

DISCUSSION

Czech and Slovak species of genus *Sibinia* are mostly monophagous or oligophagous. Species which are strictly bound or at least noticeably prefer vegetation (plant species) with a special biological requirement have a considerable bioindicative value. In this case bound to the sandy habitats. Such a plant growing in panonian sands is *Gypsophila paniculata* which is bounded to slightly alkaline sands of original or at least close to original character. *Sibinia unicolor* is in Pannonian region practically monophagous on this plant, while elsewhere it was collected on a related *G. fastigiata* L. (DIECKMANN 1988). It's presence seems to indicate habitat preservation, which we confirmed on locality ERD (Hungary) also by finding of two strictly psammophilous species from genus

Mecinus: *M. ictericus* (Gyllenhal, 1838) and *M. pirazzolii* (Stierlin, 1867) which are bound to psammophilous species *Plantago arenaria* Waldst. & Kit. (SMRECZYŃSKI 1976). On the contrary, for original (close to original) acid sands are host plants of weevils from the genus *Sibinia* typical *Armeria vulgaris* and *Spergula morisonii* Boreau, so that the occurrence of its parasites i.e. *S. sodalis* and *S. pyrrhodactyla* respectively could high probably indicate local well-preserved acid sands habitats. *S. pyrrhodactyla* is also mentioned as a bioindicative species by OLŠOVSKÝ (2008). *Armeria vulgaris* sometimes occurs also on the degraded border of sandy areas, e.g. asphalt roads edges, where the occurrence of *S. sodalis* was not confirmed though. Extremely low adsorption capacity of non-carbonated sands of Borská nížina lowland causes its very low filtering ability. It means, that their physical-chemical properties changes very fast, especially soil reaction. Even a quite small amount of calcium fertilizer reflects the significant degradation of soil acidity, on the other hand the acid rain rapidly increases the soil acidity (BEDRNA, 2008). Non-carbonated sands are due to their physical-chemical properties very susceptible to intoxication, most toxic substances are there very mobile, so that easily pass into plants (BEDRNA 2008). Those are just some of the reasons why more attention in a field of conservation of those close to natural habitats should be payed. Localities of this type, with significant bioindicative species, should be urgently protected from exploitation, since it serves as a reservoir of indigenous species - a natural gene bank.

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