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Sinoxylon anale as wood borer insect and its parasites

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Abstract: *Sinoxylon anale* as wood borer insect and its parasites. A piece of furniture imported to Warsaw from India was used for the investigations. The wood borer insect was defined as *Sinoxylon anale* Lesne. The wood was hardly damaged by the larvae. *There is 4.8 cm^3 of wood for one adult who has left wood.* In the conditions of high population density of the local population of *S. anale* only few holes of adults of Chalcidoidea have been found that are parasites. The death of adults in exuvium was probably caused by microorganisms.

Keywords: Sinoxylon anale, wood borer insect, parasites

INTRODUCTION

Sinoxylon anale Lesne, 1897 (*Coleoptera, Bostrichidae*) is very cosmopolitan species recorded in different countries (Baker and Berry 1978, Allen et al. 1997, Dominik and Starzyk 2004, Bajpai 2007, Gumovsky 2010, Lykidis et al. 2016). Their xylophagous larvae live in timber and wood packaging materials, destroying them so much that they crumble during unloading (Allen et al. 1997, Dominik and Starzyk 2004). The presence of *Sinoxylon anale* was also noted in Poland (Dominik 1970, Śliwa 1971, Krajewski and Mazurek 2010). *S. anale* can settle in heated house interiors in winter and destroy wooden furnishings (Dominik 1970, Śliwa 1971). The larval tunnels in wood can be very numerous. Wood damage can be very severe. Under these circumstances, there may be parasites and predators that destroy *S. anale*. A list of *S. anale* potential parasites was also made (Gumovsky 2010).

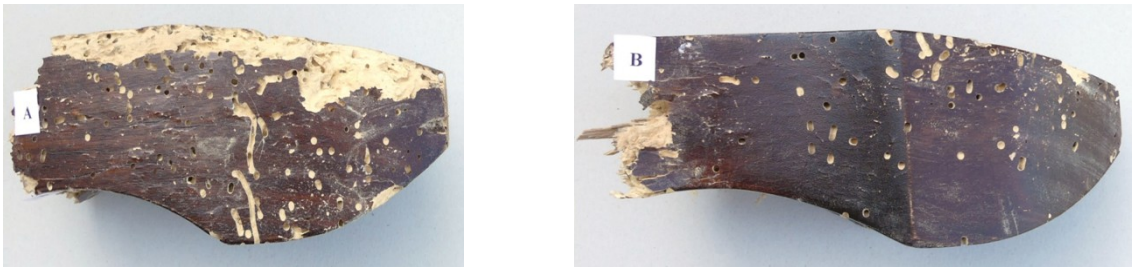

Figure 1. The wood sample that was used in the study

The "rose wood" investigations with *S. anale* tunnels were done. This wood was imported from India to Poland. The number and size of insects that left in the wood, the number of insects that died in the wood, and the presence of predators and parasites were examined. The purpose of the research was to pre-determine the possibility of natural reduction of *S. anale* in wood that is imported into Poland.

MATERIAL AND METHODS

A piece of furniture was used for the investigations, which was imported to Warsaw from India (Figure. 1). The furniture was imported to Poland in winter.

The furniture was made of an indeterminate wood species. This wood has been designated under the trade name as “rose wood”. The furniture showed a high degree of damage. The wood borer insect was designated as *Sinoxylon anale* Lesne (Figure 2).

Figure 2. Adult of *Sinoxylon anale* Lesne

Measurements of the wood sample size were made. The volume of wood was calculated. The number of imagines holes was calculated. Hole diameters were measured. Imagines’ holes are ranked in size classes. Based on the number of holes, the number of beetles per 1 cm^3 of wood was calculated. 1/3 part of the wood was split into very small pieces. The number of dead insects that were find in the wood were counted. Their condition was assessed.

RESULTS AND DISCUSSION

The condition of the wood interior is shown in Figure 3.

Figure 3. The condition of the wood interior

All the wood was heavily riddled with holes. The number of holes and diameters of holes are shown in the Table 1.

Larvae droppings do not have a geometric shape, neither do those of *Lyctus sp*. After defecation, etched wood sawdust by *S. anale* tends to collect into small clusters. This phenomenon does not occur in *Lyctus sp*. *Lyctus sp*. was included in the *Lyctide* family (Dominik and Starzyk 2004), which is currently the subfamily *Lyctine* in the *Bostrychidae* family (Borowski and Węgrzynowicz 2007).

Table 1. Number of imagines holes and diameters of holes

The side	The total number of holes in side	The size class of hole diameters	The number of holes in class
A	70	1.1 – 1.5 1.6 – 2.0 2.1 – 2.5 2.6 – 3.0 3.1 – 3.5	3 1 14 48 4
B	43	1.1 – 1.5 1.6 – 2.0 2.1 – 2.5 2.6 – 3.0 3.1 – 3.5	0 1 4 36 2
C	31	1.1 – 1.5 1.6 – 2.0 2.1 – 2.5 2.6 – 3.0 3.1 – 3.5	1 6 6 16 2
D	42	1.1 – 1.5 1.6 – 2.0 2.1 – 2.5 2.6 – 3.0 3.1 – 3.5	1 7 9 19 6

The results of hole diameter measurements in classes are presented in Figure 4.

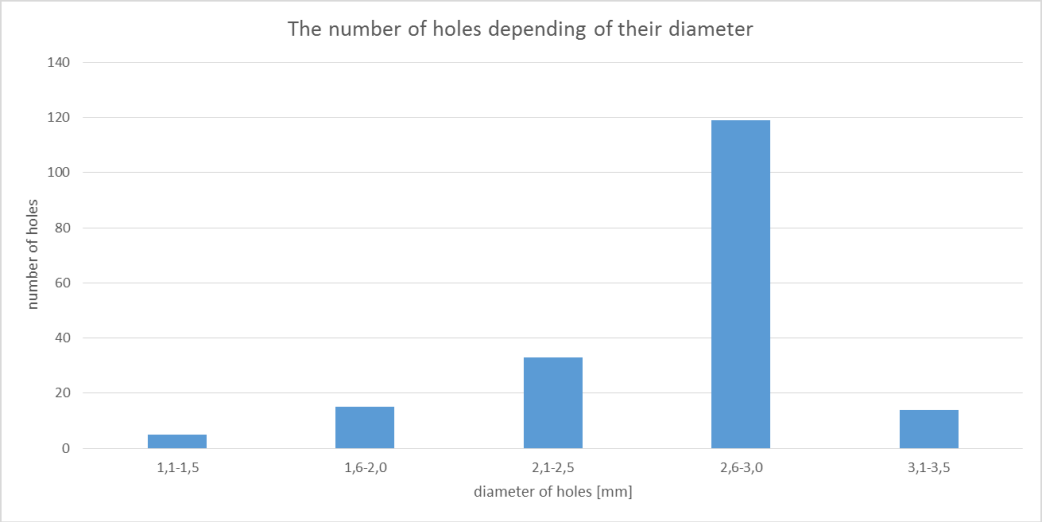

Figure 4. The total number of holes in classes for damaged piece of furniture

There is 4.8 cm^3 of wood for one adult who has left wood. The amount of wood per individual is actually even smaller because some of the insects were dead before leaving the wood.

It is not known how many adults left the wood after being brought to Poland. At least 15 adults left the wood in the laboratory. The adults' body length is determined to be "about 5 mm" (Dominik and Starzyk 2004). This value was found through the measurements made during the experiment. The diameter of adults was measured to compare with the diameter of the holes. The share of hole sizes in individual classes does not differ from the normal distribution. Imagines' hole diameters are generally defined as "up to 3 mm" (Dominik and Starzyk 2004). It seems that the holes with a diameter below 1.6 mm are not made by *S. anale*. Probably the holes with a diameter less than 1.6 mm were made by predators or

parasites of S. anale. Several species of Chalcidoidea are known as *S. anale* parasites. An annotated list of 6 known chalcidoid parasitoids (*Hymenoptera: Chalcidoidea*) of bostrichid beetles is given (Gumovsky 2010):

Family Chalcididae: *Tanycoryphus conglobatus* Steffan, 1950,
Tanycoryphus criniger Steffan, 1950,
Family Pteromalidae: *Cheiropachus quadrum* (Fabricius, 1787),
Cerocephala aquila (Girault, 1920),
Family Eurytomidae: *Endobia donacis* Erdos, 1964,
Family Eulophidae: *Entedon stephanopachi* Hedqvist, 1959.

In this case, the species of *Chalcidoidea* could not be identified because no individual was found in the wood. In Europe, only *Entedon stephanopachi* Hedqvist (*Eulophidae*) is expected to be a bostrichid specialist rather than an associate of other xylophagous beetles (Gumovsky 2010).

Dead adults in exuvium were spotted in the wood (Figure 5). The death of these adults was probably caused by microorganisms.

Figure 5. Dead adults in pupa exuvium from wood interior

Microorganisms are potential perpetrators of death for larvae and adults at very high population density of *Sinoxylon anale* in wood.

CONCLUSIONS

The winter period did not prevent adults from leaving the wood in a heated room. In the conditions of high density of the local population of *S. anale*, quite numerous dead young adults in pupa exuvium have been found in the wood. The reason for their death has not been clearly explained. The content of larvae borings is not a feature that makes it possible to identify the species as *S. anale* (or *Sinoxylon* in general). There are no droppings in the holes that have a characteristic shape.

Only few holes (3–4) of adults of Chalcidoidea have been found that are parasites of *S. anale*.

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Streszczenie: *Sinoxylon anale, jako szkodnik drewna i jego parazytoidy*. Do badań wykorzystano mebel, który sprowadzono do Warszawy z Indii. Ksylofagiczny owad, który zniszczył drewno, oznaczony został, jako *Sinoxylon anale* Lesne. Drewno było bardzo mocno uszkodzone przez larwy. Na jednego dorosłego osobnika, który opuścił drewno, przypada 4,8 cm^3 drewna. W warunkach wysokiej gęstości miejscowej populacji *S. anale* stwierdzono jedynie kilka otworów dorosłych osobników *Chalcidoidea*, które są pasożytami. Śmierć imago w exuvium była prawdopodobnie spowodowana przez mikroorganizmy.

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