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A small-scale habitat survey of dead wood of Scots pine and black cherry with special regard to Coleoptera

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Aim of the survey

Since not a single research on dead wood had been conducted in Flanders, this first survey in 1996 was an exploration of the order of magnitude of xylobiont invertebrate populations (arthropods) and of their diversity. It was also a scan of which major factors might influence these populations. In the meantime research is going on in several forest reserves.

Tree species (Scots pine and black cherry) and type of dead wood (branchwood, standing stemwood, lying stemwood or stumps) were the major factors investigated. Furthermore moisture content and decay stage of the wood parts were considered.

Location

In 1996 in the regional forest of Ravels, dead wood of Scots pine and black cherry was present from natural die back and for black cherry in large amounts, due to the active pest control. Meanwhile all black cherry wood has been removed as fuel wood. Stand 54/55 was selected for the collection of dead wood parts.

Invertebrate traps

The invertebrate community was sampled by means of emergence traps ("Totholzeklektoren", fig. 1) similar to those used in Bavarian forest reserves. A number of selected parts of dead wood were placed in a nylon netting-tent, topped with an alcohol trapping box, in which the flying individuals of the arthropod community are captured.

Results

Arthropod community

Between April and October 1996, 9000 arthropod individuals were trapped from 0.7 m dead wood of Scots pine and 5000 from 0.5 m dead wood of black cherry. The composition of the xylobiont invertebrate populations is broadly similar for the two tree species (fig. 2 and 3). The greater share of the flies (Diptera) in Scots pine wood is

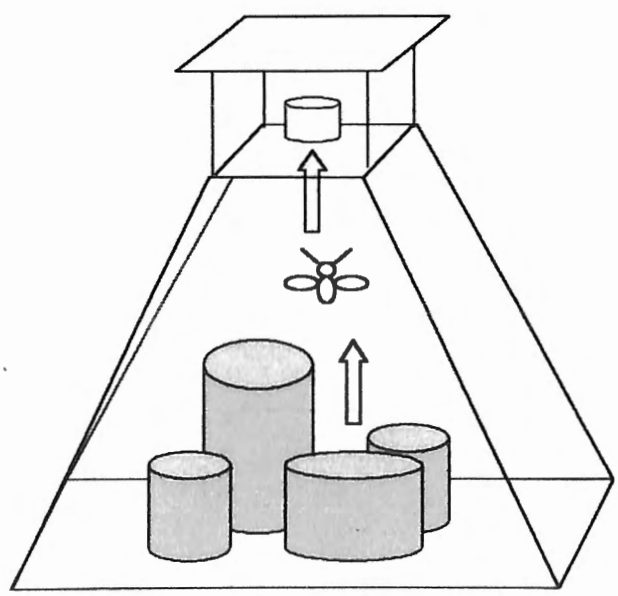

Fig. 1 — Scheme of the dead wood emergence trap, parts of dead standing stems inside.

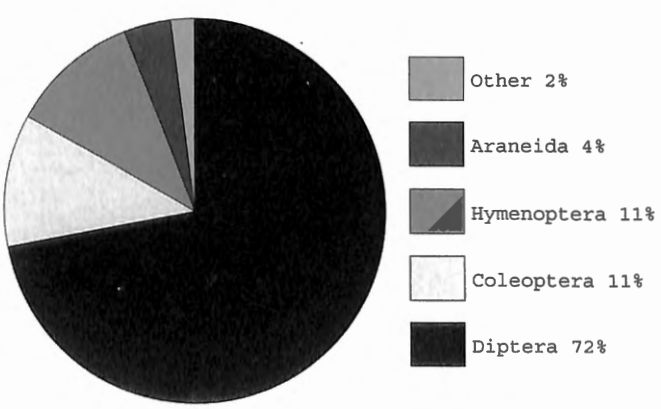

Fig. 2 — Proportional shares of the arthropod orders in dead wood of Scots pine.

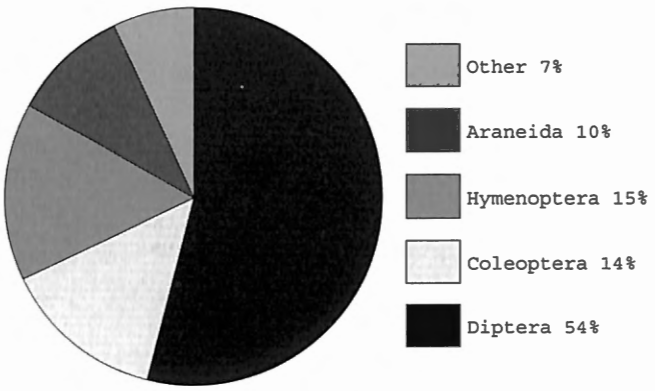

Fig. 3 — Proportional shares of the arthropod orders in dead wood of black cherry.

due to a very high density of Diptera individuals in the stumps of Scots pine: ± 1700 individuals per 0.1 m. Compared to results in surrounding European countries, these figures are normal.

Species diversity of Coleoptera

It should be noted that no complete inventory of the xylobiont beetle species in the forest of Ravels was achieved. These species numbers are minima.

Only 38 beetle species were found in both Scots pine and black cherry wood (fig. 4.). In absence of one of the two tree species, the total beetle diversity would be much lower. The dead wood of the black cherry, a rather recently introduced tree species, contains not only considerable numbers of arthropod individuals, but a well-established beetle population as well.

Influence of dead wood type on beetle population

The survey turned out to be too small to be used for statistical inference and to result in useful conclusions about the factors influencing diversity.

Nevertheless it was found that standing stemwood of Scots pine contained the most diverse beetle population (40 species on 134 individuals trapped in 0.2 m dead wood; Shannon-Weaver H_s = 3.35; Evenness = 0.91). This can possibly be explained by the gradient in moisture content and decay stages in standing stemwood.

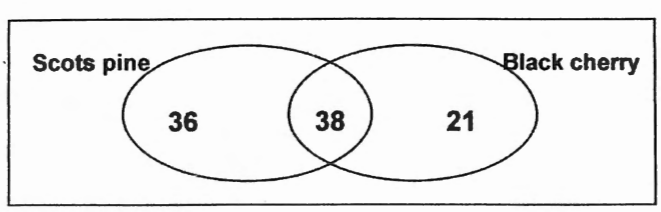

Fig. 4 — Distribution of the identified beetle species over the two tree species.

Samples of this type of dead wood were taken at different heights of the standing stems.

A deviating beetle population was present in branchwood of Scots pine that was sampled in a stand, which was thinned during the previous winter. In this branchwood a few scolytid pest species dominated largely. Furthermore this was the only type of dead wood in which pest species were present in significant (but not epidemic) amounts.

Naturalness

As could be expected, the beetle population of the dead wood in this very young forest shows not a single highly specialised species. As a value for the naturalness of the population (according to RAUH 1993) 0.24 was obtained, which compared to the naturalness of forest reserves in Bavaria (between 0.86 and 1.52) is very low.

Conclusions for management

The dead wood of the two tree species together contains more beetle species than that of a single one of them. This indicates that the ongoing conversion to mixed stands of soft- and hardwoods (pine, oak, birch) will be positive for the diversity of xylobiont beetle species.

Concerning the combat method of black cherry the following can be stated:

- the liquidation of this species creates high amounts of dead wood in a very short time. Primarily this only stimulates ubiquist xylobiont species. Highly specialised, rare species are unlikely to profit from this on the long term;
- the total and large-scale extraction of all this dead wood as fuelwood on the other hand leads to the periodic disappearance of the habitat ''dead hardwood'' from this forest. It will take several decades before a considerable amount of dead wood of hardwood species will come into existence again. This is clearly negative for the colonization of the forest by specialised species on the long term.

We conclude that a continuous diversity of different types of dead wood, be it of exotic or indigenous, of broadleaved or coniferous species, of small or large dimensions, should be aimed at in any given forest situation. Total extraction of certain types of dead wood should be avoided.

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