Qualitative Survey of Five Beech Damaging Coleoptera (Scolytidae and Lymexylonidae) in Wallonia (Southern Belgium)

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Abstract

In 2000 and 2001, *Trypodendron domesticum* L. and *T. signatum* (F.) (Col.: Scolytidae) were one of the main causes of the depreciation of more than 1,600,000 m³ of standing beech trees, *Fagus sylvatica* L., in Wallonia (Southern Belgium). In 2001, a survey aiming at assessing the range of those indigenous ambrosia beetles, so far discreet and poorly studied, pointed out that they are omnipresent all over Wallonia. Two other scolytids and one lymexylonid (Col., Lymexylonidae) were also frequently caught, which made it possible to outline their regional distribution too.

Key Words: Scolytidae, *Trypodendron* spp., *Xyleborus dispar*, *Taphrorychus bicolor*, Lymexylonidae, range, Southern Belgium

Introduction

As a consequence of an exceptional frost that severely affected beech trees over a broad area of Southern Belgium in November 1998, populations of *T. domesticum* and *T. signatum* reached epidemic levels in 2000 and 2001 (Huart and Rondeux 2001). More than 1.6 million m³ of beech trees were damaged within the two years, almost exclusively at elevations above 350 m a.s.l. (Rondeux et al. 2002). Apart from the fact that these outbreaks were an economic disaster, the 2001 attacks were very worrying since they occurred on standing and apparently healthy trees, which is quite uncommon for both *Trypodendron* species. Information on these species was very incomplete, especially from a biogeographical point of view : a survey was thus initiated to outline their range. *Xyleborus dispar* (F.) and *Taphrorychus bicolor* Herbst (Col.: Scolytidae), as well as *Hylecoetus dermestoides* L. (Col.: Lymexylonidae) were also frequently caught, which made it possible to outline their regional distribution.

Materials and Methods

In order to get an idea of the beetles' distribution, a network of 172 traps was set up throughout the six natural regions of Wallonia (Fig. 1), from April to October 2001. The traps were hooked on beech trees (of variable dbh) and baited with ethanol (release rate ca. 250 mg/day). All traps were located in beech stands (beech relative basal area > 66 %) that were >1 ha., attempting to obtain a homogenous sample of the Walloon beech forest. Because of the small size of the traps (10 X 23 cm), of the low number or traps/site, and of the relatively low attractivity of the traps (as compared to attractive woody material) in physiologically weakened stands, the absence of a species in captures at individual sites does not necessarily indicate that the species is not present there. For the same reasons, the number of insects captured was not compared between sites: only the presence was recorded.

Results and Discussion

The number of traps (NT) placed in each Walloon natural region, the number of sites where each species was caught (number of presences, NP) and the observed presence rate (OPR=NP/NT) is provided in Table l. Table 1 also provides some characteristics of the Walloon natural regions, such as the percentage of beech forest (42,400 ha in total) present within each region (BC, according to Lecomte, in press) and the elevation (E).

Table 1 shows that the scolytid beetles are omnipresent in Wallonia, in all natural regions and at all elevations. Only *H. dermestoides* was not captured in the sandy loam and loess regions, but its ecology and the sampling methodology led to an undervaluation of its range.

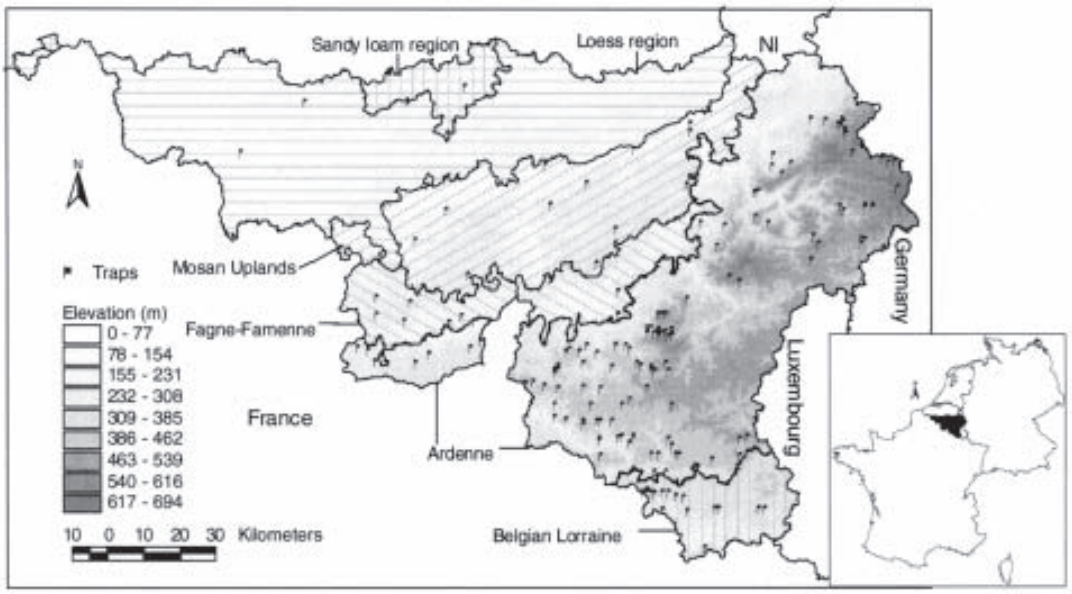

Figure 1.—Distribution of the traps in Wallonia (Southern Belgium)

The wide distribution of both secondary *Trypodendron* spp. confirmed that the triggering factor of the attacks was limited to natural regions where beech trees had undergone damage (Ardenne and Belgian Lorraine). With other elements, this fact supports the climatic accident hypothesis (early, sudden and deep frost) since the Ardenne and Belgian Lorraine are the more elevated natural regions of Wallonia (where the elevation may exceed 350 m), and are characterized by greater and more sudden fluctuations in temperature.

The attacks were thus probably triggered by an exceptional accident occurring in 1998 (unusual frost). In 2001, while their populations were at very high levels, *T. domesticum* and *T. signatum*

Table 1.—Number of presence(s) and observed presence rate of each species in different Walloon natural regions (sandy loam and loess regions are clustered).

	BC	Elevation (m)	NT	*T. domesticum*		*T. signatum*		*X. dispar*		*T. bicolor*		*H. dermestoides*	
				NP	OPR	NP	OPR	NP	OPR	NP	OPR	NP	OPR
Sandy loam and Loess regions	6	20<E<200	4	3	75	2	50	4	100	4	100	0	0
Mosan Uplands	8	200<E<350	15	11	73	7	47	11	73	13	87	5	33
Fagne-Famenne	2	100<E<250	9	6	67	5	56	8	89	6	67	2	22
Ardenne	69	200<E<700	128	111	87	69	54	85	66	36	28	20	16
Belgian Lorraine	15	200<E<450	16	13	81	7	44	11	69	6	38	1	6
Wallonia	**100**	**20<E<700**	**172**	**144**	**84**	**90**	**52**	**119**	**69**	**65**	**38**	**28**	**16**

BC: Beech cover (in % of the total beech forest area in Wallonia)
NT: number of traps
NP: number of presence(s)
OPR: observed presence rate (%).

attacked standing and apparently healthy trees over large areas, which is quite uncommon for these species. Some additional factors, such as previous storms, repeated droughts, air pollution, deterioration of soil properties and stand over-ageing probably worsened the situation. So far however, the reasons of the high and apparently temporary attractivity of many beech trees in 2001 (that did not exhibit frost injuries) are not fully understood. Nevertheless, these events indicate some fragility of the Walloon beech forests and suggest that silvicultural practices improving the vigor of the trees (early and regular thinnings, diversification of stand composition and structure) should be encouraged. At the same time, stress-inducing practices, such as logging methods that damage the forest floor, or late heavy thinnings creating sudden exposure to light of shade tolerant species (like beech), should be avoided. In our deciduous forests, it would be also interesting to leave some dead wood and overmature trees, in order to increase the population level of generalist entomophagous predators. Some of these, like woodpeckers, have been shown to exert a significant impact on scolytid population levels (Moore 1972), when the latter are endemic. Such an integrated approach should enable Walloon forest ecosystems to resist more efficiently such "natural accidents".

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