

The Frequency and Intensity of Bark Beetle Infestations Recorded in Romanian Forests Affected by Windfall in 1995

V. Mihalciuc¹, A. Danci², M. Bujilă¹ and D. Chira²

¹Forest Research and Management Institute Brasov, Romania

²Simon Fraser University Vancouver, Canada

Abstract

Research has been carried out during the past six years (1996-2001), to record the occurrence of wind damage in resinous stands and to monitor the evolution of pest infestations during this period. The level of pest attack has become moderate over time and depended on different types of damaged wood material (cut, broken and fallen trees). We also reported about the incidence of infested standing trees in correlation with the quantity of windthrown wood.

Introduction

A windfall of vast proportions occurred on November 5-6, 1995, that severely affected Romanian forest stands in the following counties: Covasna, Harghita, Mureş, and Bistriţa from Oriental Carpathians (Simionescu et al., 2001). Research was carried out over the years after windfall, and has been conducted in experimental plots characterized by the presence of a variety of stands and different environmental conditions. The purpose of these investigations was to study the evolution and the dynamics of pests attacking both windthrown and standing trees.

Materials and Methods

A large number of experimental plots were located in areas affected by windfall, where we registered damaged trees (fallen, broken, cut and pruned trees). These trees were analyzed in order to find out the diversity of bark and wood boring insects, the intensity of infestation, and their developmental stages. Relying on these data, we estimated the frequency of infestation over time, and recommended appropriate control measures and the opportune time for their application.

Results

The evolution of infested woody material over time. In the majority of circumstances, spruce trees were infested at a high level. The main pests which infested damaged trees were the following: *Ips typographus*, *Pityogenes chalcographus*, *Ips amitinus*, *Polygraphus poligraphus*, *Trypodendron lineatum*, *Hylurgops palliatus*, *Tetropium castaneum*, *Monochamus sutor*, *Urocerus gigas*, *Orthotomicus suturalis*. In the first year after the windfall (1996), the intensity of insect attack was generally low. Intensive infestations were observed only in areas where bark beetle outbreaks were recorded in the past. During the next years (1997-2000) the infestation increased significantly, and as a result in 2000 we registered high and very high levels of pest attacks in all damaged areas (Fig. 1).

The influence of damage type on infestations

In all damaged areas, about 40% of the trees were windthrown and 60% were broken at the base of trunks. The windthrown trees were still connected with the soil, and continued to vegetate during the next 1-3 years after the windfall. During this period, the frequency of infestation by pests was 34% in 1996, 61% in 1997, and 5% in 1998. Over 90% of the broken and fallen trees were infested in 1996, and less than 5% in 1997.

The period between the occurrence of damages and the time that trees were attacked varied in relationship with the type of tree damage – windthrown, broken or cut trees (Table 1). Cut and pruned trees were infested within 1-2 months, broken at the basal part of stem and fallen trees were

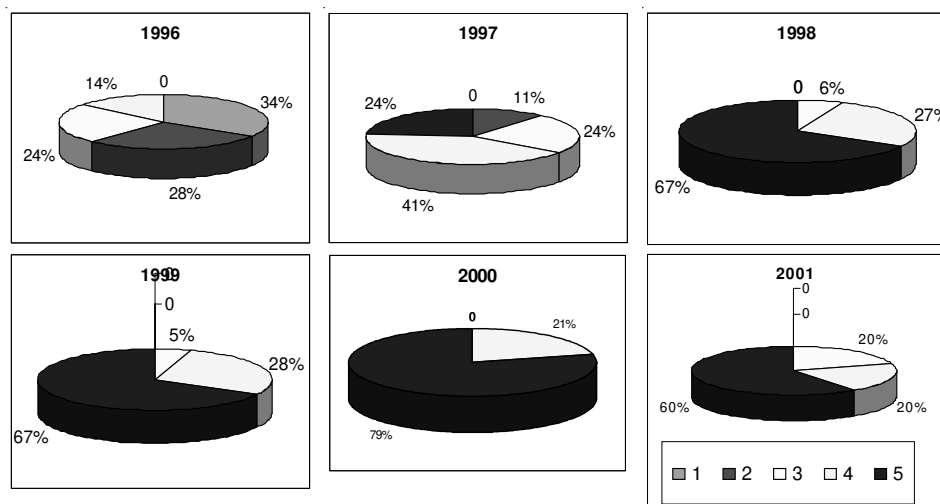


Figure 1.—Distribution of the intensity of bark beetle infestation after the November 5, 1995 windfall (Counties of Covasna, Harghita, Mureş, and Bistri a; 1: very low, 2: low, 3: medium, 4: high, 5: very high)

infested after 6-7 months, and windthrown trees were infested within 7-18 months after windfall. Because of these results, we strongly recommend that damaged wood material should be removed before infestation by bark beetle species can occur.

The infestation of standing trees after the windfall

We established a correlation between the quantity of damaged wood material recorded in 1995 and the percentage of infested standing trees that were recorded between 1996-1998. The large number of fallen trees favored bark beetle outbreaks. This was reflected indirectly by the increased number of standing trees that were infested. This situation was especially evident in the Ranger Districts of Covasna and Comandău where the volume of damaged trees was the largest.

The highest number of infested standing trees occurred four years after the calamity - 8,300 trees in Ranger District Covasna and 14,548 trees in Ranger District Comandău. In 2000, the number of infested standing trees was reduced significantly as a result of the protection measures which were implemented in the damaged forests during 1996-1999 (Mihalciuc et al. 2001).

Table 1.—The period (months) between damage and stem infestation (County of Covasna, Mureş, Bistriţa, Braşov, Prahova, Sibiu; 1995-2001)

Type of damage	Main pests								
	It	Ia	Pc	Tl	Hp	Hg	Os	Ms	Ug
Windthrown trees	14.7	15.0	17.9	14.2	16.2	14.7	13.5	7.5	8.5
Trees broken by wind from the basal part of stem	7.1	7.0	7.3	6.2	-	-	-	-	-
Trees with basal stem sectioned (cut), and pruned	1.2	1.7	1.4	2.1	2.6	-	1.6	-	-

It: *Ips typographus*; **Ia:** *Ips amitinus*; **Pc:** *Pityogenes chalcographus*; **Tl:** *Trypodendron lineatum*; **Hp:** *Hylurgos palliatus*; **Hg:** *Hylurgos glabratus*; **Os:** *Orthotomicus suturalis*; **Ms:** *Monochamus sutor*; **Ug:** *Urocercus gigas*.

Conclusions

1. The level of infestation of damaged trees and the number of infested standing trees were highest 3-5 years after the windthrow of 1995.
2. In the first year after the damage (1996), over 90% of the trees broken at the basal part of stem were infested; the windthrown trees were infested during the next two years after the windfall (1996-1997); at high altitude and on slopes with intermediate exposure, the infestation took place beginning in 1998.
3. The larger volume of damaged wood material was favorable to the development of higher bark beetle populations; however, annual control measures have reduced the severity of pest outbreaks.

References Cited

- Simionescu A., V. Mihalciuc, A. Vlăduleasa, O. Badea, T. Fulicea, M. Lițescu, A. Danci, M. Bârca, S. Popescu, and P. Enescu. 2001.** The health state of Romanian forest between 1986-2000. Ed. Musatinii, Suceava (in Romanian).
- Mihalciuc V. A. Danci, N. Olenici, and A. Vlăduleasa. 2001.** Sanitary state of resinous stands from Romania and the protection measures applied in the 1990-2000 period. In: M. Knizek., B. Forster, W. Grodzki (eds.). Methodology of Forest Insect and Disease Survey in Central Europe. Proceedings of the Fourth Workshop of the IUFRO WP 7.03.10, September 17-20, 2001, Praha, Czech Rep. J. For. Sci., 47, Special Issue 2: 136-138.