

THE INFLUENCE OF MISTLETOE (*VISCUM ALBUM* SPP. *ABIETIS*) ATTACK ON FIR TREE (*ABIES ALBA*) IN SOLCA FOREST ARRONDISSEMENT SUCEAVA DISTRICT

INFLUENȚA ATACULUI PRODUS DE VÂSC (*VISCUM ALBUM* SSP. *ABIETIS*) ASUPRA BRADULUI ÎN OCOLUL SILVIC SOLCA JUDEȚUL SUCEAVA

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Abstract. *The present paper was elaborated as a consequence of a study made by the U.P. III Ilișești production unit, in the u.a. 26A and 27A organization units. The Solca Forest Range and it followed the debilitation of some fir trees caused by the attack produced by the mistletoe (*Viscum album* ssp. *abietis*). The mistletoe causes a strong physiological debilitation with effects on the growth of the trees, on the wood quality and a high vulnerability of these ones to strong winds, heavy snow falls, to the attacks of the pathogen agents, especially, insects and fungus. The main negative effect of the attack produced by the mistletoe is the wood qualitative degradation, leading to the death of the tree.*

Key words: *Viscum album* ssp. *abietis*, forest, damages, attack

Rezumat. *Lucrarea de față a fost elaborată în urma studiului efectuat în cadrul unității de producție U.P. III Ilișești, în unitățile amenajistice u.a. 26A și 27A, Ocolul silvic Solca și a urmărit debilitarea unor arborete de brad cauzată de atacul produs de vâsc (*Viscum album* ssp. *abietis*). Vâscul provoacă o pronunțată debilitare fiziologică cu efecte asupra creșterii arborilor, a calității lemnului și vulnerabilității ridicată a acestora la vânturi puternice, căderi abundente de zăpadă, la atacurile agenților patogeni, în special, insecte și ciuperci. Principalul efect negativ al atacului produs de vâsc este degradarea calitativă a lemnului, conducând la moartea arborelui.*

Cuvinte cheie: *Viscum album* ssp. *abietis*, pădure, pagube, atac

INTRODUCTION

Of the three mistletoe subspecies *Viscum album* subsp. *album* L, *Viscum album* subsp. *Pini*, *Viscum album* subsp. *Abietis*, in Romania can be met only the *Viscum album album* and *Viscum album abietis* subspecies. The distribution of these two subspecies is not fully known. The *Viscum album abietis* subspecies is spread in the northern region of Romania (Maramures, Bucovina) and in Banat (Barbu, 1991).

The fir mistletoe is spread in a few places from Bucovina (Ilișești, Humor Monastery, Solca, Bucșoia, Slătioara on Prihodiște, Putna), Maramureș (Bistra on Topolau, Gruitul popii, Petrova, Repedea on Holovraci, Dragomirești on Turcusescu) and Dealul Lung in the Forest of Peltic (the Focsani region). The fir mistletoe is also spread in the Anina and Oravita Forest Range (Nanu, 1969) in Banat. Subsequent studies (Barbu, Barnoiaia, 2005; Barbu, 2006) showed that the mistletoe was spread in the Forest Ranges of Văratec, Vaduri, Casin Monastery,

the trees that are predisposed to drying, there were discovered a series of typical symptoms such as: the obvious flattening of the top by the premature forming of the “stork nest”; the progressive rarefying of the crown from bottom to top and from inside to outside, the appearance of the dry branches in the crown, as a consequence of the premature fall of the needles from the inferior and middle third of the crown; the abnormal thickening of the branches and of the stem at the intersection of the branches on the stem, in the middle third of the crown; the appearance of the “greedy” branches on the stem and on the superior side of the Ist order branches; the diminution of the needles length and of the growths in the last years; abundant fructification (almost every year) in the sick trees, small cones; strong mistletoe attack that determines the 2-3 times thickening of the branches or of the stem in the middle third of the crown. Due to the lack of light, in the thick trees, the mistletoe installs itself on the taller trees (dominant and predominant), without producing very bad damages.

The trees from studied area were included in the four damaging classes (Barbu, 1995), that establish the main evolution phases of the attack and the outer symptoms that can be observed in the trees crown: class 0- characterized by the lack of the mistletoe attack (figure 2a); class 1- incipient attack with mistletoe bushes on the sideways branches (figure 2b); class 2- moderate attack with high frequency of the mistletoe bushes in the crown and with dry branches (figure 2c); class 3- strong attack with mistletoe bushes in the whole crown and on the stem, often with asymmetric crowns and dry top (figure 2d).

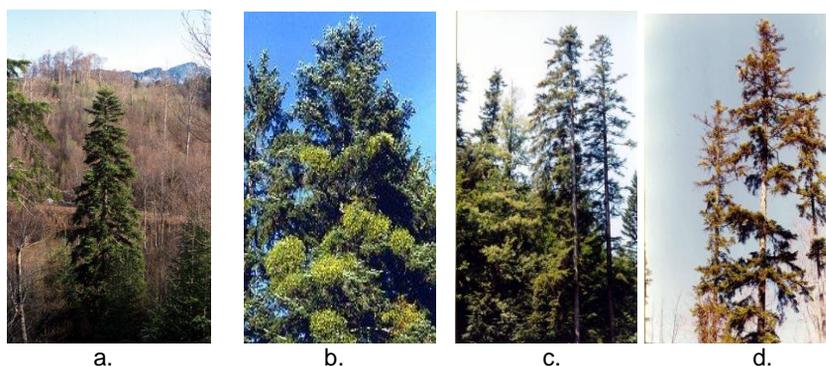


Fig. 2. The framing of the parasite trees in damaging classes (a, b, c, d.) (original)

When the age of the attack is older (the last phase of the attack), there are no more mistletoe bushes in the crown, but the traces of the attack are obvious among the dry branches, the dry top and the deformations at the level of the branches and stem. Often, the trees whose crown is almost dry form on the stem a compensation crown (greedy branches) that often has a length bigger than the crown itself taking over the photosynthetic functions of this one. These crowns formed themselves in the last 15-20-25 years (figure 3 a,b). In this way, it can be explained the fact that the trees that are in the last phase of the attack (3rd class) have in the last years a remarkable growth.

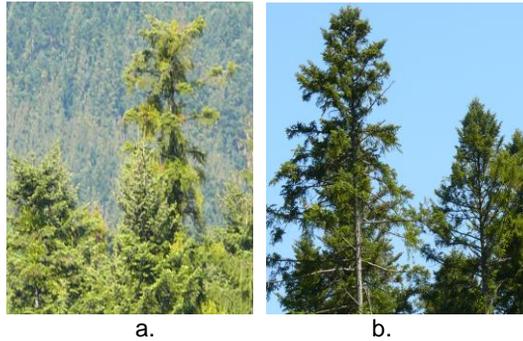


Fig. 3. The crown morphology. **a.** dry branches, the fall of the needles; **b.** the crown asymmetry, the stork nest (original)

The mistletoe haustorium grows progressively and reaches up to the host cambium area for absorbing water and mineral salts, confirming Frochot and Sallé's researches from 1980, Sallé 1983. The haustorium exceeds the cambium area and they passively deepen into the wood (they do not actively interact with the xylem but they are passively embedded into the wood). In the longitudinal section, the haustorium has an elliptical shape, of different sizes, and in the tangential section they have the shape of nails. The cortical belts go along the liberian tissue and as a result they lead to the sideways extension of the mistletoe.

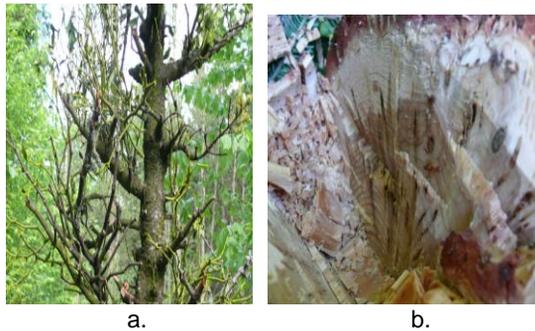


Fig. 4. The mistletoe haustorium effects. **a.** abnormal thickening of the branches; **b.** traces left by the haustorium in the branches of the trees attacked at the insertion on the stem of the mistletoe (original)

The distribution analysis of the number of trees on diameters categories it is noticed on SP I Ilișești test surfaces 26A, that the highest weight of the infested trees is comprised between 50-58 cm diameters categories.

Taking into consideration that the SP I Ilișești 26A test surface is of 1000 m² and we have the following distribution, extra polling at each hectare, we will get the following percentages: 22% represents the trees from the 0 damaging class; 26% the trees form the 1 damaging class; 43% of the trees from the 2nd damaging class; 9% of the trees from the 3rd damaging class (figure 5).

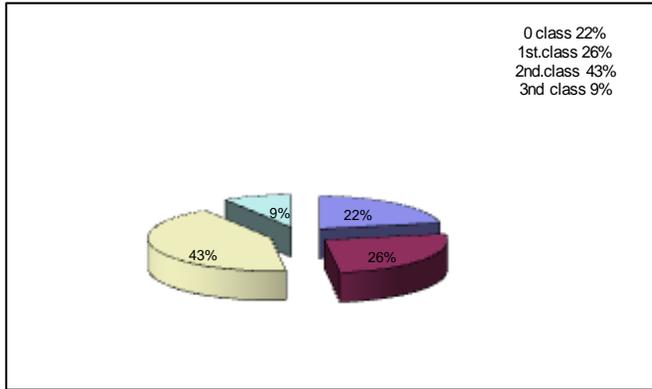


Fig. 5. The distribution of the number of trees on damaging classes (u.a. 26A)

In the SP II Ilişesti 27A test surface the highest weight of the damaged trees, because of the attack produced by the mistletoe, it is comprised between the 36-48 cm diameter categories.

It is noticed that in the SP II Ilişesti 27A test surface the percentage of the trees attacked by the mistletoe is over 70% from the total number of inventoried trees. The trees from the 1st class of damaging hold the biggest percentage (35%), followed by the trees from the 2nd and 3rd damaging class (25%), meaning 10% (figure 6).

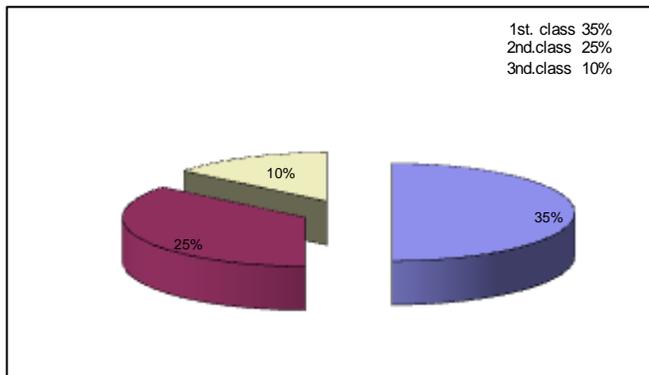


Fig. 6. The distribution of the number of trees on parasitic classes

It is noticed that the percentage of the healthy trees is of 30%, while the percentage of the trees attacked by the mistletoe is of 70%.

CONCLUSIONS

After the research it was observed: in the test surface placed in the 26A organization area the percentage of the trees attacked by the mistletoe is of 78%,

in comparison with the percentage of the test surface from the 27A organizational area which is of 70%;

In the SP I Ilișești test surface, the damaging class the has the biggest weight is represented by the 2nd class with a percentage of 43%, while in the SP II Ilișești test surface the damaging class with the biggest weight is represented by the 1st damaging class;

As part of the SP I Ilișești 26A test surface the greatest weight of the trees attacked by the mistletoe is comprised between the 50-58 cm diameter categories, categories that differ in the case of the SP II Ilișești 27A test surface, being comprised between 36-48 cm;

The mistletoe exerts on the trees a pathological action that can be seen from two points of view: physiological and economical;

From here results that the mistletoe has on one side influences on the trees growth, and on the other side on the wood quality.

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