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Original Article

The Prognosis of *Lymantria dispar* Defoliator Occurrence in the Deciduous Forests from North - Western Transylvania, for the Year 2015

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Abstract

The negative evolution of Romanian Quercinae forests health state, needs a careful analysis of the managing methods of these forestry ecosystems, in terms of disease and pests control and management measures. In this paper is presented the prognosis for the year 2015, of *Lymantria disappear* defoliator evolution, present in the northwestern Transylvanian oak forests. The reports concerning the *Lymantria dispar* defoliator are being done in all developmental stages of the insect and the detection of infested surfaces is done after the eggs are depositited in September - October. All analysis performed upon the samples taken from the three Forestry Departments and four Forestry Districts revealed that defoliator is in retrogradation, which corresponds to the situation in which all adjacent surfaces for analyzed samples will be included in 2015 in the surveillance zone.

Keywords: Quercinae, management, caterpillar, oak.

1. Introduction

Due to the negative evolution of our forests vegetation health state in generaly, and of those of Quercinae species in particulary, it's required a more careful analysis of the managing methods of these forestry ecosystems, both in terms of disease and pests control but also in terms of the silvicultural measures they demand [1, 3, 7]. In this context it't enrolled the prognosis for the *Lymantria dispar* defoliator, that is performed annually.

In this paper is presented the prognosis for the year 2015, of *Lymantria disappear* defoliator evolution, present in the northwestern Transylvanian oak forests.

In the studied area, northwestern part of Transylvania, forests represent about 983,642 ha of which 52% deciduous, mainly oaks, reason why the defoliators prognosis and especially the oak's hairy caterpillar prognosis becomes mandatory [1, 2].

Lymantria dispar (the oak's hairy caterpillar) is the pest with the highest breeding potential. Over the time *Lymantria dispar* has formed large populations especially in oak formations [4, 5, 6, 8]. Caterpillars hatching occurs in the second part of April, and the larval stage lasts between two or three months.

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2. Material and Method

The reports concerning the *Lymantria dispar* defoliator are being done in all developmental stages of the insect and the detection of infested surfaces is done after the eggs are depositited in September - October. An area is considered to be infested by *Lymantria dispar* if at 50 trees are found egg deposits. In case of *Dermestes* species activity that destroy spawns of *Lymantria dispar* as well as in the presence of specific parasites, in spring the population density is rechecked and the prognosis is recalculated. A unit or a group of landscape units uniformly infested are diagonally planned through in order to analyze at least 10 to 20 trees/shrubs, with that occasion spawns (egg deposition) are inventoried and the trunk diameter of oak trees is mesured at a height of 1.30 m. The population density is reported to the tree [9]. Fecundity (f) is the number of eggs from a deposit and is determined by the formula:

$$f = 1204.56 \times g + 40.89$$

where g represents the average weight of a deposit; and is determined by collecting and weighing 40-50 layings egg.

Density (D) is the product between the average number of deposits on trees and fecundity (f) - the number of healthy eggs from a deposit.

The defoliation percentage is calculated by the ratio between the density and the critical number

The gradation phase is determined by:

- the average weight of living female laying eggs;
- the average fecundity - the number of healthy eggs/deposit;
- the average weight of an egg deposition (mg);
- the sexual index $\frac{F}{F+M} \times 100$- which is determined in layings egg stage;
- mortality (%) of eggs, mites, pupae;
- butterfly coloration.

The defoliator prognosis can be carried out in the butterfly or egg stage, the last one with more precise results, the reason why further on are presented the laboratory data obtained at this stage.

3. Results and Discussions

As it has been shown in the previous chapters, the studies were conducted in the deciduous forests, more precise in the oak forests from the northwestern Transylvanian Forestry Department, namely Satu-Mare Forestry Department and Oradea Forestry Department, for *Lymantria dispar* defoliator. *Lymantria dispar* (oak's hairy caterpillar) is the pest with the highest multiplication potential. Over the time, the defoliator has formed scale gradations especially in oak forest formations.

Reports on the defoliator presence were done in all the developmental stages, and the detection of infected areas was made after the eggs were deposit between September - October, 2014.

Analyses were performed in the Laboratory of Forestry Protection of ICAS Station Cluj, where fecundity was determined, by finding the number of viable eggs, the graduation stage was set.

In Marghita Forestry District (table 1) samples were collected from Forestry Units II and III, 50 laying eggs being analyzed for each landscape group unit, according to the known instructions. The parasitical activity was particularly high, passin over 50% within Forestry Unit III and about 25% in Forestry Unit II. The number of laying eggs was low, so that the viable number of eggs/laying eggs was 45.4 in F.U. III or about 160 in F.U. II. These elements show that the defoliator is in retrogradation or in the forth graduation phase.

A particularly situation is given by the infestations within Tinca Forestry District (table 2), in which laying eggs were harvested for analysis for Gorunişte and Peri Forest Parts within Forestry Unit I, Apateu Forest Part of F.U. VII and Ateas Forest Part of F.U.VIII.

As it results from the table below in all the analysed samples, the defoliator is in the IV-th phase of gradation where parasitism is set between 17.9% and 69.4%. In the last situation, besides the fact that parasitism was very high, the laying eggs were very small, the average number of eggs being of 113.2.

Another interesting situation as it results from the table below (table 3) was found in Tăşnad Forestry District where even if spawns were relatively higher, the high parasite degree caused the reduction of the number of eggs/deposit. Analysis were performed in four production sites, on groups of a.u and the analyzed deposits ranged between 20 F.U.VI and 34 in F.U.IV, which could lead to errors in the prognosis, since it is known that the minimum number of laying eggs to be analyzed is 50. We notice that the parasitical degree is quite high from 17.3% in F.U. VI, to 67.1% in F.U.IV, which made possible the classification of the defoliator in the IVth phase of graduation. Moreover, the number of viable eggs per laying eggs is very low, from 43.9 in FUIV to 320.4 in F.U.VI.

In Magura Şimleu Forestry District the infestation was spread on about 50 ha, so that only one sample was considered, laying eggs were quite small, and the parasitism as it results from table 4, was very high. The number of viable eggs was of 166.3, and the graduation phase, the forth.

Table 1. Qualitative elements of the *Lymantria* defoliator from Marghita Forestry District, Bihor Forestry Department

Sample no.	Origin		No. of analysed samples	Fecundity				Graduation phase
	F.U.	l.u.		Total	Parasite %	Sterile%	Viable	
	II	42-46	50	207.1	23.6	0.4	157.4	IV
147		40-41	50	181.8	24.8	0.4	156.6	IV
	III	12-28	50	93.7	50.6	1.0	45.4	IV

Table 2. Qualitative elements of the *Lymantria* defoliator from Tinca Forestry District, Bihor Forestry Department

Sample no.	Origin		No. of analysed samples	Fecundity				Graduation phase
	F.U.	l.u.		Total	Parasite%	Sterile%	Viable	
	VII	Apateu Part	50	113.2	69.4	1.6	32.83	IV
149	I	Gorunişte Part	50	293.8	23.4	0.3	223.6	IV
		Peri Part	50	346.8	19.6	0.3	277.8	IV
	VIII	Ateaş Part	50	280.6	17.9	0.6	228.7	IV

Table 3. Qualitative elements of the *Lymantria* defoliator from Tăşnad Forestry District, Satu Mare Forestry Department

Sample no.	Origin F.U.	l.u.	No. of analysed samples	Fecundity Total	Parasite %	Sterile%	Viable	Graduation phase
	II	13-19,21,24,25	29	233.6	25.9	0.1	172.9	IV
	IV	10-28,44,49-51,53,54	34	137.3	67.1	0.9	43.9	IV
151	V	39,42,46,73,74,76,78,84	26	274.6	20.7	0.3	216.9	IV
	VI	4-7,20-22,35-37	20	390.2	17.3	0.2	320.4	IV

Table 4. Qualitative elements of the *Lymantria* defoliator from Măgura Şimleu Forestry District, Sălaj Forestry Department

Sample no.	Origin		No. of analysed samples	Fecundity				Graduation phase
	F.U.	l.u.		Total	Parasite %	Sterile%	Viable	
98	I	55.456	50	207.1	19.3	0.4	166.3	IV

The analyses performed in this autumn refering to *Lymantria disappear* defoliator for the northwestern part of Transylvania, revealed that the defoliator stands in retrogradation , namely in the forth pahase of graduation.

4. Conclusions

The studies and analyses conducted in deciduous forests from northwestern Transylvania have revealed that the most affected forestry formations by the presence of *Lymantria disappear* defoliator are based on oaks. Beech forests, especially pure ones are rarely affected by pests and even less by defoliating insects.All analysis performed upon the samples taken from the three Forestry Departments and four Forestry Districts revealed that defoliator is in retrogradation, which corresponds to the situation in which all adjacent surfaces for analyzed samples will be included in 2015 in the surveillance zone.

The explanation of the curent situation is that in the last two years in those areas have been more or less significant defoliations, the defoliator being in graduation, in fact in some areas (Marghita and Tăşnad Forestry District) in the spring of 2014 AVIO combat was used.

The studies and laboratory analyses performed at ICAS Cluj Station show the importance of establishing the prognosis for the major forestry defoliatiatos, wich should be performed every year, and by the proposed measures the integrity and stability of the forest stands are being maintained.

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