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# Forecasting defoliators found in Transylvanian oak forests

<sup>1</sup>Romică Tomescu, <sup>1,2</sup>Ioan Tăut, <sup>1,2</sup>Vasile Şimonca, <sup>2</sup>Ilie Covrig

<sup>1</sup>Institutul de Cercetări și Amenajări Silvice (ICAS) București, Filiala Cluj, Romania, EU; <sup>2</sup>University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania, EU. Corresponding author: I. Tăut, ioan\_taut90@yahoo.com

Abstract. The purpose of this paper is the early prevention of pest occurrence in a given area, by applying at the right time, optimal control measures, before the pest can produce powerful attacks. The forecast can be made on short or long periods. The studies and analyses conducted in the Transvlvania deciduous forests have shown that the most affected forest formations are those of oaks. Beech forests and especially pure forests are rarely affected by pests and even less by defoliating insects. In the case of the Forest District Ulmeni, the Forestry Department Baia Mare was observed a gradation of the defoliator Lymantria dispar in the pure beech stands in the spring of 2007, but was stopped after the application of an AVIO treatment. The analyzed defoliators Lymantria dispar and Tortrix viridana are in gradation in all the studied forest formations in most cases but without producing significant defoliations, except for the trees located within the Forestry Department Satu-Mare, the Forest District Carei and the Forest District Livada. The laboratory analysis performed at ICAS Cluj Research Station show that setting the forecasting for the main forestry defoliators is absolutely necessary and must be carried out every year, and that through the proposed measures is maintained the integrity and stability of the forest stands. The indirect density determination of the defoliating populations can be performed with sufficient precision in the egg stage from the qualitative analysis of the Lymantria dispar eggs and from the sequential analyses of Tortrix viridana. Long-term forecasting for the populations evolution of the two defoliators can be achieved by creating a system of permanent monitoring networks with variable density (between about 30 and approx. 300-500 ha), according to the history of attacks, the degree of forest stands fragmentation, phytosanitary and vegetation estate, the particularities of the climate regime. Besides the defoliators for which was conducted the forecast in 2014, it also presents a gradations risk in the studied area Euproctys chrissorhoea, Malacosoma neustria and various species of Geometridae.

**Introduction**. Protecting forests from the negative action of the biotic factors likely to endanger their existence, or to reduce their capacity of fulfilling ecological, or productive functions, assumes also among the knowledge of injury symptoms an appropriate technique for applying the protection measures (Meijerman & Ulenberg 2004; Şimonca et al 2011; Burduhos et al 2013). In this context a special role is assigned to the detection and forecast of harmful insect populations (Dissescu 1966; Fratian 1973; Prokopenko 1992; Marcu & Dieter 1995; Voicescu et al 2002; Tomescu & Neţoiu 2006; Şulea et al 2013).

In Transylvanian forests, in which are often found ecological imbalances or abnormal conditions, the most important damages are produced by defoliating insects in the bulk propagation period (Rudnev 1962; Gottschalk 1990; Netoiu & Taut 2006; Marc & Péré 2006; Meshkova 2007). Thus, it was found that from the total surface area of about 985.000 ha represented by the deciduous forests (52%), preponderant are pure or mixed oaks stands. For this reason and with priority in this mentioned forest groups studies were carried out on the prognosis of injuries.

These studies have taken into account the features of harmful insect populations (density, fecundity, gender ratio, natural mortality and external appearance).

In order to restore the ecological balance in these stands, are required the use of various means for maintaining under control the mass multiplication of pests, pest forecasting being the first mean under accessible level, reachable to forest engineers,

serving to the best knowledge of the dynamic evolution of harmful population but also to anticipate the manifestation of limitative factors.

The purpose of this paper is the early prevention of pest occurrence in a given area, by applying at the right time, optimal control measures, before the pest can produce powerful attacks.

**Material and Method**. The knowledge of the phytosanitary estate is achieved through an informational system based on collecting the field data previously mentioned, their enrollment in technical and statistical records, the interpretation of these results and the report of pest occurrence, by indicating the development evolution of the population concerned (latency or gradation-with the four phases, namely: the early phase, the numerical growth phase, the eruption phase and the critical phase).

Further on, the signaling reports are checked and surfaces are determined by intensity degree after methodologies and specific values for each pest in part, operation which is called screening.

As we presented above, the purpose of this research is to make possible the early prevention of pest occurrence in a given area, by applying at the right time, optimal control measures, before the pest can produce advanced attacks. The forecast can be made on short or long periods.

The detection and forecasting of forest pests represents an important measure in the forest protection activities, due to their action, the health state of forests can be known at any time of the year (Order no. 454 from 07/14/2003).

Establishing a forecast which can reflect the real situation in the forest, requires sampling from control surfaces permanent placed in stands where gradations exist or in favorable areas. From these areas will be obtained the information, both quantitative and qualitative data, and the possible injury rate for each pest in part.

The main pests, for which the forecasting is done, are shown below in Table 1, from which it can be seen that damages can appear both at seeds (stored acorn), as well as at seedling roots, in nurseries or in stands. This paper presents the forecast for the main defoliators of oaks stands.

Table 1

List of main pests that cause damages to forest crops and stands with oaks species in their composition, and for which can be achieved forecasting and control measures

Pests (Scientific name, popular name)	Damages
Melolontha melolontha - May beetle	Causes damages mainly by biting
<i>Melolontha hippocastani</i> – Forest beetle <i>Amphimallon solstitialis</i> – June beetle	the roots (larvae) in nurseries and plantations and adults leave stands
Polyphylla fullo – Grained beetle	leafless
<i>Gryllotalpa gryllotalpa</i> – fen cricket	In nurseries
Agriotes lineatus, A.ustulatus – wire larva	
Lymantria dispar – the hairy caterpillar of oaks	In oaks forests, by tree defoliation
Tortrix viridana – the green moth of oak	
Malacosoma neustria – the ring worm	
<i>Euproctis chrysorrhoea</i> – the butterfly with gold tail <i>Thaumatopoea processionea</i> - the oak caterpillar	
Operophtera brumata - cotar	
Erannis sp. – cotar	
Tischeria complanella - the mining moth of oak	
Haltica quercetorum – the beetle leaf of oak	
Aspeyresia splendana - the acon cartepilar	At acorns from storage spaces
Balaninus glandinum- the acon rammer	

Quantitative data refers to population density, expressed as the ratio between the number of insects at the unit of measure, as the case may be, tree, branch, bud or surface. Here we also discuss about the population growth coefficient R, which represents the ratio between the current population density (d1) and the population density from the previous year of mass multiplication (d2). Finally, also at quantitative data, we talk about frequency, as the ratio between the number of attacked trees and the total controlled trees.

The most important qualitative elements that give guidance on the future evolution of caterpillar populations are the gender report or sexual index (or) female fecundity and parasitism.

Fecundity is a mixed element. From the qualitative point of view provides information on the gradation phase and direction where is heading and from the quantitative point of view, is essential for determining the populations density of insects in the egg stage. It's easily and accurately determined for species that lay eggs grouped in a single deposit.

Fecundity is the element depending on which is being established the graduation phase and the sexual index (I) as the ratio between the number of females (F) and the total number of insects (F + M); I = F/F + M.

Depending on these items is being established the defoliation percentage as the ratio between the population density (d), and the critical number (n).

These elements were considered for defoliators *Lymantria dispar* and *Tortrix viridana.* 

**Results and Discussions.** Analyses were carried out in deciduous forests, specifically in oaks forests from the Transylvania Forestry Directions, namely the private Forest Districts in this area, for the main defoliators, namely, *Lymantria dispar* and *Tortrix viridana*.

The detection and the forecasting of the defoliator *Lymantria dispar*. *Lymantria dispar* (the hairy caterpillar of oak) is the pest with the highest propagation potential. Over the time, the defoliator has formed graduations of amplitude, especially in oak forestry formations.

Reports on the defoliator's presence were done in all of its development stages and the detection of infested areas on which eggs were deposit, was made during September 2013 - February 2014 (Table 1).

The data in Table 2 show that from all the 14 analyzed samples from four forestry departments and six private forest districts, only in two samples the defoliator is found in the I-II phase of graduation, namely at the Forest District Tinca and at the Forest District Măgura Şimleul Silvaniei, the rest were found in phase III-IV, so in retrogradation.

From of the analyses obtained and presented in Table 2, it appears that the defoliator *Lymantria dispar* will not produce significant damages in the spring of 2014 in Transylvanian forests, and the corresponding areas for the analyses carried out, will be introduced in the surveillance zone.

**Tracing and forecasting the defoliator** *Tortrix viridana*. *Tortrix viridana* (the green moth of oak) is the defoliator with the highest spreading in the oak area, which is confirmed also by our studies and analyses.

As well as for the previous defoliator, the detection and forecasting can be done in all the development stages, but most accurate date are obtained by egg forecasting.

This consists in the analysis of six branches for at least 1 m in length each, from a tree, two branches from the base, two from the middle and the other two from the top of the crown. These trees, usually three in a parcel, must be evenly distributed in the forest. On each branch are counted the developed buds and by using the binocular the eggs are identified. The data obtained from the samples analyzed are presented in the Table 3.

#### Table 2

### Results of the analyses carried out on the populations of the defoliator *Lymantria dispar* within the forecast of year 2014

No.	Forestry	Forest	Forest body	The	Qualitative characteristics				s	
	Department	District	(U.P., u.a.)	number	g.med.	Fertilized	Parasited	Sterile	Viable	Gradation
				of	/dep.					phase
				analysis						
			l X-Xuani	report	0.400	F22.6	0.0	0.4	400 C	
			Lăzăreni Apateu		0.409	533.6 522.7	8.0 7.2	0.4	488.6 479.7	III III
			Boboștea		0.422	549.2	8.5	0.9	497.2	III
			Ateas		0.46	595.0	9.8	0.6	533.0	IV
			Chişirid	23	0.423	550.4	10.8	0.2	489.4	IV
			Mihişuş Mare		0.452	585.4	5.5	0.7	549.1	III
		Oradea	Mihişul Mic		0.343	454.1	8.0	1.0	413.1	III
			Nojorid		0.35	462.5	9.7	0.5	415.3	IV
			Lemnul Morii		0.5	643.2	8.2	1.0	584.0	III
			Şuhaida		0.401	524.0	9.1	0.5	473.7	III
			I, 45-62 II, 25-27		0.353	466.1 207.1	19.8 28.6	1.0 0.8	369.1 146.1	IV IV
1	Bihor	Marghita	II, 40-46	31	0.138	561.3	9.4	0.8	506.9	III
		riarginea	III, 40-40 III, 13-62	51	0.394	515.5	6.6	0.3	477.4	III
			IV, 90-149		0.296	397.4	8.6	0.6	360.4	III
		Săcueni	II, 50-106		0.39	510.7	6.6	0.5	474.4	III
		Bihor	III, 14-69	32	0.146	216.8	18.4	4.4	167.4	IV
			IV, 1-96		0.196	277.0	26.8	2.8	195.0	IV
			I, 149-173		0.432	524.5	7.7	0.4	482.5	I-II
			I, 66-127		0.52	630.5	8.4	0.3	575.5	I-II
		Tinca	I, 1-90	17	0.432	524.5	12.8	1.7	448.5	I-II
			II, 1-90		0.44	535.1	7.6	0.5	492.1	I-II
2	Mauran	Constants	III, 42-50	20	0.46	558.2	6.5	0.5	520.2	I-II
2	Maramureş	Şomcuta Mare	IV, 31-44	30	0.276	332.5	10.8	0.8	293.5	IV
		Mare	III, 19-35		0.452	585.4	11.4	0.3	516.9	IV
			III, 4-18		0.451	584.1	13.3	0.5	503.1	IV
		Satu	V, 85-89	20	0.493	634.7	6.3	0.9	588.7	III
		Mare	V, 51-72		0.505	649.2	15.6	0.5	544.2	IV
			I, 15-31		0.523	670.9	12.6	-	585.9	IV
			II, 14-57		0.42	547.0	8.8	0.4	496.7	III
3	Satu Mare		III, 27-57	22	0.42	547.0	8.5	0.3	498.9	III
5	Satu Mare	Tăcnad	IV, 8-52	22	0.63	799.8	10.0	0.5	715.8	IV
		Tăşnad	V, 22-94		0.44	571.0	10.9	0.1	508.0	IV
			VI, 6-45 VII, 14-61		0.514	660.0 655.2	11.8 11.4	0.2	580.8 577.2	IV IV
		Măgura	VII, 14-01		0.513	658.8	5.8	0.5	617.3	I-II
4	Zalău	Şimleul Silvaniei	I, 56	19	0.515	050.0	5.0	0.5	017.5	1 11
			I, 102-109		0.283	381.8	7.8	1.4	346.7	III
			VI, 123-125		0.22	305.9	15.8	0.6	255.7	IV
		Sfânta	VI, 163-164	52	0.276	373.3	11.4	0.4	329.3	IV
		Ana	VII, 4	52	0.143	213.1	14.2	2.6	177.1	IV
			VII,69-71		0.286	385.4	11.4	1.2	336.8	IV
		Codrii	VII,107-113 I, 25	51	0.259	352.9 646.8	12.7 7.9	0.6	306.9 592.8	IV III
		Beiuşului	I, 25 II,24-30	JT	0.503	703.4	5.8	0.4	660.4	III
		Salcâmul	II,24-30 II,28-39		0.353	466.1	19.8	1.0	369.1	III IV
		Ciumești	II, 1-7	50	0.138	207.1	28.6	0.8	146.1	IV
			IV,60-64		0.296	397.4	8.6	0.6	360.4	III
			I-II,142-144	-	0.693	875.7	7.8	0.4	803.7	I-II
		Brătcuța R.A.	I-VII,106- 110	45	0.305	408.3	14.2	1.6	356.0	IV
			IV, 1-3		0.454	587.8	13.3	0.7	505.5	IV
5	ITRSV	Ardud	IV,48-88		0.343	454.1	13.9	0.5	388.7	IV
	Oradea	R.A.	IV,5-18	42	0.344	455.3	12.7	0.5	395.2	IV
			V,54-59		0.261	355.3	13.4	0.8	304.8	IV
			Pir		0.405	528.7	14.5	0.3	450.5	IV
		<u> </u>	III,50-53		0.533	658.8	10.0	1.1	607.0	IV
		Codrii Sătmarul	IV-V,1,49	20	0.29	390.2	16.1	0.5	325.2	IV
		ui R.A.	VII,19-44	29	0.44	570.9	12.1	0.6	497.9	IV
			I-IV,21-50 IV,74-77		0.57	727.5 496.2	12.5 10.8	1.0 0.8	629.3 11.6	IV IV
1	I		10,/4-//		0.370	450.2	10.0	0.0	11.0	1 V

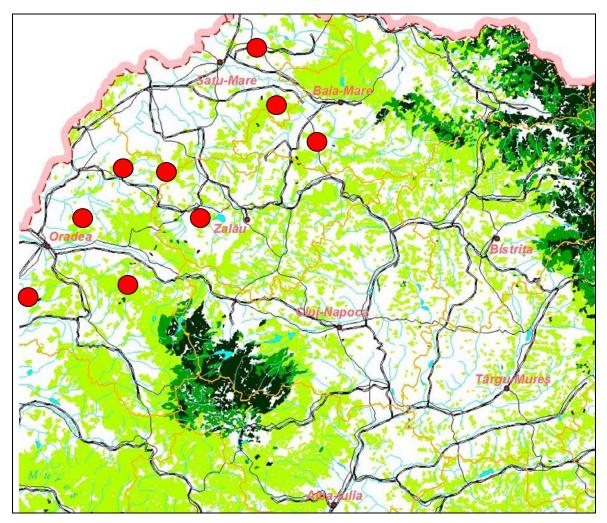


Figure 1. Locating the populations of the defoliator *Lymantria dispar* (processing after the Forestry Map of Romania, source: www.icas.ro)

From Table 3 we can observe that from all the 19 analyzed samples, only in two situations, namely, within the Forestry Department Satu Mare (Forest District Livada), and the Forest District Ardud R.A., the likely defoliation degree was weak, and in the rest of the cases very weak, situation in which the areas corresponding the analyzed samples will be proposed to be included in the surveillance zone.

Table 3

The results of the analyses	performed on the defoliator	Tortrix viridana, 2013-2014

III, 55-79         0.062         Very weak         6.2           III, 93-103         0.66         Very weak         6.6           III, 25         40         0.066         Very weak         6.6           0.066         Very weak         6.6         0.070         Very weak         6.6           0.066         Very weak         6.6         0.066         Very weak         6.6	No.	Forestry Department	Forest District	Forest body (U.P., u.a.)	No. of analysis report	Infestation coefficient	Infestation degree	Likely % of defoliation
Bistrita         Bistrita         I,14,15 I,39         28         0.023 0.015         Very weak Very weak 2.3         2.3           2         Cluj         Cluj         II,19         0.021         Very weak 2.3         2.0           3         Cluj         Cluj         III,1-4         0.021         Very weak 2.3         2.0           3         Gherla         V,88         38         0.049         Very weak 2.3         4.2           4         III,125         0.01         Very weak 4.17.0         0.05         Very weak 4.2         4.2           3         III,144         0.17         Weak 4.17.0         0.062         Very weak 4.2         6.6           0.070         Very weak 4.2         0.070         Very weak 4.2         6.6           0.056         Very weak 4.56         0.056         Very weak 4.2         6.6           0.059         Very weak 4.2         0.00         Very weak 4.2         0.00 <td></td> <td></td> <td></td> <td>I. 9-10</td> <td></td> <td>0.017</td> <td>Verv weak</td> <td>1.7</td>				I. 9-10		0.017	Verv weak	1.7
Bistrita         II, 4-5 I, 39         0.015 Very weak         Very weak         1.5 Very weak </td <td></td> <td></td> <td>Bistrita</td> <td></td> <td>28</td> <td></td> <td></td> <td></td>			Bistrita		28			
1         Bistritja         I, 39         0.021         Very weak         2.1           2         Cluj         Cluj         III, 149         27         0.033         Very weak         1.2           3         Gherla         V, 13         0.023         Very weak         3.3           3         Gherla         V, 88         38         0.049         Very weak         4.9           3         III, 15.77         Mark         111, 55.79         0.062         Very weak         6.2           111, 34.84         111, 34.84         0.056         Very weak         6.6           0.056         Very weak         5.9         0.056         Very weak         5.9           5 satu Mare         1, 62-63,92         0.014         Very weak         9.0           6 ury weak         1, 32,53,97         0.014         Very weak         9.0           4         Târgu Mureş         II, 49         0.02         Very weak         2.0           1, 49, 13,2         0.02         Very weak         3.3         1.4         0.02         Very weak         2.0           1, 49, 13,2         0.02         Very weak         1.4         0.02         Very weak         2.1 <tr< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>								
Beclean         IV, 149         27         0.018         Very weak         1.8           2         Ciuj         Cluj         III, 107         45         0.035         Very weak         3.5           3         Gheria         V, 88         38         0.049         Very weak         4.5           3         Gheria         III, 95:103         0.17         Weak         6.6           1II, 406-418         0.056         Very weak         6.6           0.066         Very weak         5.6           0.066         Very weak         5.6           1II, 406-418         0.059         Very weak         5.6           0.066         Very weak         5.6           0.070         Very weak         5.6           1II, 414         0.056         Very weak         5.6           1II, 42         0.097         Very weak         5.6           3         X, 71         0.09         Very weak         1.3           4         Târgu Mureş         I, 49         0.013         Very weak         2.0           1, 49         0.027         Very weak         2.1         0.021         Very weak         2.2           1, 48         14	1	Bistrița						
Image: constraint of the section of the sec		-	Beclean		27		· · · · · · · · · · · · · · · · · · ·	
2         Cluj         Cluj         II,107         45         0.035         Very weak         3.5           3         Gheria         V,88         38         0.049         Very weak         4.9           3         III,157:9         0.017         Weak         17.0           1II,25:79         0.066         Very weak         6.2           1II,14         0.055         Very weak         6.6           0.066         Very weak         5.6           0.066         Very weak         5.6           0.066         Very weak         5.9           1II,14         0.059         Very weak         5.9           0.066         Very weak         5.9           5atu Mare         1, 47,73         21         0.014         Very weak         9.0           3         X,71         0.02         Very weak         2.0         0.02         Very weak         2.0           3         X,79         0.02         Very weak         2.0         0.02         Very weak         2.0           4         Tárgu Mures         II,34         36         0.021         Very weak         2.1           1,49         II,39         36         0.02								
Gheria         V, 88         38         0.049         Very weak         4.17.0           3         III, 14         III, 55-79         0.017         Weak         17.0           2         III, 25-79         III, 25-79         0.066         Very weak         6.6           III, 25-79         0.066         Very weak         6.6           III, 466-418         0.056         Very weak         5.6           0.055         Very weak         5.6         0.056         Very weak         5.9           Satu Mare         I, 62-63,92         0.019         Very weak         9.0           Satu Mare         I, 47,73         21         0.014         Very weak         9.0           K, 71         0.02         Very weak         9.0         Very weak         9.0           K, 72         0.02         Very weak         2.0         0.02         Very weak         2.0           Ludus         II, 34         36         0.022         Very weak         2.2           Ludus         II, 48-104         46         0.33         Very weak         2.1           Ludus         II, 14-31-98         0.024         Very weak         2.1           V1, 46-55         0.	2	Cluj	Cluj		45			
4         Târgu Mureş         III, 95-79 III, 93-103 (III, 26-418) III, 24-84         0.062 0.66         Very weak 7.0 0.066         6.6 0.070           Satu Mare         III, 40-418 III, 40-418         0.055         Very weak 7.0055         6.6 0.056           Satu Mare         I, 62-63.92 I, 42,737         0.013         Very weak 7.009         9.9 0.095           Satu Mare         X, 71 X, 72         0.024         Very weak 7.2         9.0 0.09         Very weak 7.2         9.0 0.02           Gurghiu         X, 72 X, 25         0.02         Very weak 7.2         2.0 0.02         Very weak 7.2         2.0 0.02           Luduş         II, 49 1V, 32         0.02         Very weak 7.2         2.0 0.02         Very weak 7.2         2.0 0.02         Very weak 7.2         2.0 0.02         Very weak 7.2         2.0 0.02         2.0 0.02         Very weak 7.2         2.2         0.02         Very weak 7.2         2.2         2.2         2.2         2.2         2.2         2.2         2.2         2.2         2.2         2.2         2.2         2.2         2.2         2.2         2.2         2.2			Gherla	V, 88	38	0.049	Very weak	4.9
4         Târgu Mureş         Livada         III, 93-103 III, 25 III, 34-84 III, 44         0.066 0.070         Very weak 0.066         6.6 0.095           Satu Mare         III, 34-84 III, 44         0.099         Very weak 5.9         6.6 0.055         Very weak 5.9         6.6 0.056         Very weak 5.9         6.6 0.056         Very weak 5.9         5.9           Satu Mare         I, 62-63,92 II, 32,53,97         0.091         Very weak 9.0         9.0         Very weak 9.0         9.0           K, 71         0.09         Very weak 9.0         0.02         Very weak 9.0         0.02         Very weak 9.0         2.0           K, 79         0.02         Very weak 9.0         0.037         Very weak 9.0         3.7           Luduş         II, 34-104         46         0.033         Very weak 9.2         3.3           Very weak         1.1         1.9-51         0.022         Very weak 9.2         3.3           Vi, 105-109         Very weak         2.1         0.031         Very weak 9.2         3.3           Vi, 105-109         Vi, 46-55         0.021         Very weak 9.2         3.3         Very weak 9.2         3.3           Târgu Mureş         II, 18-19         26         0.023         Very weak 9.2         3.3 </td <td>3</td> <td></td> <td></td> <td>III, 1-4</td> <td></td> <td>0.17</td> <td>Weak</td> <td>17.0</td>	3			III, 1-4		0.17	Weak	17.0
4         Tårgu Mures         Livada         III, 25 III, 34-84 III, 34-84 III, 14         40         0.070 0.076         Very weak Very weak 5.6         7.0           Satu Mare         III, 24-84 II, 47,73         0.095         Very weak 5.9         5.6           Satu Mare         I, 62-63,92 II, 62-63,92         0.095         Very weak 5.9         0.09         Very weak 5.9           Satu Mare         X, 71 X, 79         0.02         Very weak 2.0         0.09         Very weak 2.0           X, 79         0.02         Very weak 2.0         0.02         Very weak 2.0         0.02           Ludus         II, 34         0.02         Very weak 2.0         0.02         Very weak 2.0         0.02           Ludus         II, 34         0.02         Very weak 2.0         0.02         Very weak 2.0         0.02           Ludus         III, 31-98         0.037         Very weak 2.2         0.022         Very weak 2.2         0.041         Very weak 2.2         0.021         Very weak 2.1         0.021         Very weak 2.1         0.021         Very weak 2.2         1.1         0.021         Very weak 2.2         0.021         Very weak 2.2         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1				III, 55-79		0.062	Very weak	6.2
Satu Mare         III. 406-418 (III. 34-84)         0.066 0.066         Very weak (Very weak)         5.6 5.6           Satu Mare         III. 34-84 (III. 34-84)         0.059         Very weak         5.6           Satu Mare         I. 62-63.92 (I. 52,3.97)         0.095         Very weak         5.9           Satu Mare         I. 62-63.92 (I. 52,3.97)         0.005         Very weak         9.0           Very Weak         1.4         0.02         Very weak         9.0           Murey         X, 71         0.09         Very weak         2.0           X, 79         0.02         Very weak         2.0           Uudug         I. 49         0.02         Very weak         2.0           Uudug         II, 34         36         0.072         Very weak         2.0           Uudug         I. 49         0.033         Very weak         2.3         3.3         Very weak         3.3           VI, 105-109         Very Weak         2.1         0.021         Very weak         2.1         0.021         Very weak         2.3           Târgu Mureş         III, 21-9         26         0.023         Very weak         2.3           VI, 105-109         VI, 45-55         0.021         V					]	0.66	Very weak	6.6
Satu Mare         III, 34-84 III, 14         0.056 0.059         Very weak Very weak         5.6 5           Satu Mare         1, 42,73 1, 32,53,97         21         0.095         Very weak         9.9 0.095           Satu Mare         1, 42,73 1, 12,53,97         21         0.014         Very weak         9.0 0.09           K, 71         0.02         Very weak         2.0 0.014         Very weak         2.0 0.02           Gurghiu         X, 71         0.02         Very weak         2.0 0.02         Very weak         2.0 0.02           K, 79         0.02         Very weak         2.0 0.02         Very weak         2.0 0.02         Very weak         2.0 0.02           Kardu Mures         II, 34         36         0.037         Very weak         3.7 0.02         7           Reghin         I, 48-104         46         0.33         Very weak         3.3           III, 31-98         IV, 105-109         0.021         Very weak         2.1           Sovata         IV, 5         25         0.021         Very weak         2.3           Táragu Mures         III, 22         48         0.027         Very weak         2.3           Sovata         IV, 51-54         0.021         Very weak <td></td> <td></td> <td>Livada</td> <td>III, 25</td> <td>40</td> <td>0.070</td> <td>Very weak</td> <td>7.0</td>			Livada	III, 25	40	0.070	Very weak	7.0
Image of the second s				III, 406-418		0.066	Very weak	6.6
Alt of the second sec		Satu Mare		III, 34-84		0.056	Very weak	5.6
Satu Mare         I, 47,73 I, 32,5397         21         0.014 0.09         Very weak Very weak 0.02         1.4 Very weak 9.0           4         Gurghiu         X, 71 X, 25         0.02         Very weak 0.02         2.0           5         Târgu Mureş         I.uduş         II, 49         0.02         Very weak 0.02         2.0           6         Very weak         2.0         0.02         Very weak 2.0         2.0           7         Târgu Mureş         III III, 49         0.037         Very weak 2.0         2.0           8         Reghin         I, 48-104         46         0.33         Very weak 2.3         3.3           11, 10-51         III, 13-98         0.027         Very weak 2.4         4         3.0           11, 13-198         0.021         Very weak 2.4         2.0         0.021         Very weak 2.1         4           111, 18-19         2.6         0.021         Very weak 2.2         2.3         0.022         Very weak 2.2         2.3           111, 12         48         0.027         Very weak 2.2         2.4         2.4         2.4           111, 14         10         0.022         Very weak 2.2         2.0         2.3           1111, 12				III, 14		0.059	Very weak	5.9
Image: space of the system of the s				I, 62-63,92			Very weak	9.5
4         Târgu Mureş         Gurghiu         X, 71 X, 72 X, 25         16         0.02 0.03         Very weak Very weak 0.02         2.0 Very weak 2.0           4         Târgu Mureş         I, 49 Luduş         II, 34 IV, 32         36         0.02         Very weak 2.0         3.7           7         Târgu Mureş         II, 49 IV, 32         0.037         Very weak 2.0         3.7           1         Very Weak         7.2         0.092         Very weak 2.3         3.3           1         II, 10-51         10, 13-98         0.027         Very weak 2.1         0.026         Very weak 2.1         3.3           1         IV, 106-109         V, 8-87         0.021         Very weak 2.1         0.024         Very weak 2.1         2.6           5         Sovata         IV, 5         25         0.023         Very weak 2.1         2.4           1         II, 18-19         26         0.019         Very weak 2.1         2.7           1         II, 64         0.022         Very weak 2.2         2.7         0.022         Very weak 2.7         2.7           1         II, 64         0.027         Very weak 2.7         0.022         Very weak 2.7         2.7           1         II, 36			Satu Mare		21			
4         Târgu Mureş         Gurghiu         X, 79         16         0.013         Very weak         1.3           4         Târgu Mureş         I, 49         0.02         Very weak         2.0           1, 49         0.02         Very weak         2.0           1, 49         0.037         Very weak         3.7           1, 48-104         46         0.037         Very weak         9.2           0.092         Very weak         3.3         0.072         Very weak         9.2           1, 1, 10-51         11, 10-51         0.27         Very weak         2.7           111, 31-98         11, 10-51         0.021         Very weak         2.1           0.041         Very weak         2.1         0.021         Very weak         2.1           0.025         Very weak         2.1         0.023         Very weak         2.1           10, 11         132         0.021         Very weak         2.1           110, 12         10         0.022         Very weak         2.2           111, 12         10         0.022         Very weak         2.2           110         11, 13-6         0.021         Very weak         2.5				I, 32,53,97		0.09	Very weak	9.0
4         Târgu Mureş         I. 1, 49 I., 49 I., 49 I., 32         0.02 Very weak         Very weak         2.0 0.027           4         Târgu Mureş         I., 49 I., 32         0.007 II., 32         Very weak         3.7 0.092           7         Târgu Mureş         I., 48-104         46         0.33         Very weak         2.0 0.022           8         Reghin         1, 48-104         46         0.33         Very weak         3.3 0.072           9         Nery weak         2.0 0.022         Very weak         2.1 0.024         Very weak         2.1 0.026           9         V., 8-87         0.031         Very weak         2.6 0.021         0.024         Very weak         2.6 0.021           9         V., 46-55         0.021         Very weak         2.1 0.023         Very weak         2.1 0.025         0.021         Very weak         2.1 0.025         Very weak         2.1 0.025         0.025         Very weak         2.2 0.021         Very weak         2.0 0.025         Very weak         2.0           11         12.2         48         0.027         Very weak         2.0         1.1         3.3         0.016         Very weak         2.0           5         Zaläu         IIIeanda         VII.1 </td <td></td> <td></td> <td></td> <td>X, 71</td> <td></td> <td>0.02</td> <td>Very weak</td> <td>2.0</td>				X, 71		0.02	Very weak	2.0
4         Târgu Mureş         I, 49 I, 49 I, 32         0.02 I, 49 I, 34         Very weak 0.037         2.0 Very weak 0.092         2.0 Very weak 9.2           4         Târgu Mureş         I, 48-104 I, 48-104         46 0.33         0.027         Very weak 9.2         9.2           7         Reghin II, 10-51         II, 10-51         0.021         Very weak 9.2         0.021         Very weak 9.2         9.2           1II, 10-51         III, 10-51         0.021         Very weak 9.2         0.021         Very weak 9.2         2.7           1II, 10-51         IIV, 06-109         0.021         Very weak 9.2         2.7         0.021         Very weak 9.2         2.7           1II, 10-51         IV, 5         2.5         0.021         Very weak 9.2         2.8         2.9           1V, 132         0.023         Very weak 9.2         2.8         2.9         2.1           1V, 11         136         0.022         Very weak 9.2         2.7           1II, 64         0.022         Very weak 9.2         2.7           1II, 36         1V, 51-54         24         0.027         Very weak 9.2         2.7           1Ieanda         VII, 1         33         0.016         Very weak 9.2         2.9 <t< td=""><td></td><td></td><td>Gurghiu</td><td></td><td>16</td><td></td><td></td><td></td></t<>			Gurghiu		16			
4         Târgu Mureş         I, 49 II, 32 II, 1, 48-104 II, 48-104         36 0.072 0.092         Very weak Very weak 9.2 0.092         3.7 0.092           4         Târgu Mureş         II, 48-104 II, 10-51         46 0.033         0.092 Very weak 9.2 0.021         Very weak 9.2 Very weak 9.2 0.021         3.3 Very weak 9.2 0.023         3.3 Very weak 9.2 0.023         3.3 Very weak 9.2 0.023         3.3 Very weak 9.2 Very weak 9.2 0.023         3.3 Very weak 9.2 Very Weak 9.2 Ve							Very weak	
4         Târgu Mureş         Luduş         II, 34         36         0.072         Very weak         7.2           4         Târgu Mureş         Reghin         I, 48-104         46         0.33         Very weak         3.3           4         Târgu Mureş         II, 10-51         46         0.33         Very weak         3.1           1         II, 10-51         0.021         Very weak         2.7           0.026         Very weak         2.6           0.027         Very weak         2.6           0.021         Very weak         2.6           0.021         Very weak         2.1           0.023         Very weak         2.1           0.024         Very weak         2.1           0.025         Very weak         2.1           1         1V, 21         0.022         Very weak         2.2           1         11, 64         0.022         Very weak         2.7           1         111, 36         0.027         Very weak         2.7           1         111, 36         0.027         Very weak         2.7           1         111, 35         35         0.068         Very weak         2.7								
4         Târgu Mureş         Iv, 32         0.092         Very weak         9.2           4         Târgu Mureş         Reghin         I, 48-104         46         0.33         Very weak         3.3           4         Târgu Mureş         III, 10-51         0.027         Very weak         2.7           IIII, 31-98         0.026         Very weak         4.1           0.026         Very weak         2.6           0.031         Very weak         2.6           0.024         Very weak         2.4           Sovata         IV, 5         25         0.021         Very weak         2.3           1         IV, 132         0.025         Very weak         2.2           1         II, 64         0.022         Very weak         2.5           1         II, 64         0.022         Very weak         2.7           1         II, 64         0.027         Very weak         2.7           1         III, 64         0.022         Very weak         2.7           1         Ileanda         VI, 1         33         0.016         Very weak           2         III, 64         0.022         Very weak         2.7      <								
4         Târgu Mureş         Reghin         I, 48-104         46         0.33         Very weak         3.3           4         Târgu Mureş         III, 10-51         0.27         Very weak         2.7           1II, 31-98         0.041         Very weak         2.7         Very weak         2.7           0.021         Very weak         2.6         0.031         Very weak         2.6           0.024         Very weak         2.1         0.024         Very weak         2.1           1V, 132         0.021         Very weak         2.3         0.021         Very weak         2.3           1         1V, 132         0.023         Very weak         2.3         0.022         Very weak         2.3           1         1V, 21         0.025         Very weak         2.3         0.025         Very weak         2.5           1         1V, 21         0.022         Very weak         2.2         2.0         0.021         Very weak         2.6           1         11, 22         48         0.027         Very weak         2.0           1         11, 22         37         0.054         Very weak         2.6           1         1 <t< td=""><td></td><td></td><td>Luduş</td><td></td><td>36</td><td></td><td>· · · · · · · · · · · · · · · · · · ·</td><td></td></t<>			Luduş		36		· · · · · · · · · · · · · · · · · · ·	
4         Târgu Mureş         II, 10-51 III, 31-98 V, 106-109         0.27         Very weak         2.7           0.041         Very weak         4.1         0.026         Very weak         4.1           V, 106-109         0.026         Very weak         2.6         0.031         Very weak         2.6           V, 8-87         0.021         Very weak         2.6         0.031         Very weak         2.4           Sovata         IV, 132         0.023         Very weak         2.3         0.022         Very weak         2.3           Târnăveni         III, 22         48         0.027         Very weak         2.2           Târgu Mureş         IIII, 22         48         0.022         Very weak         2.2           Târgu Mureş         IIII, 22         48         0.027         Very weak         2.5           1II, 64         0.027         Very weak         2.0         0.015         Very weak         2.0           1II, 10         11, 10         33         0.016         Very weak         2.6           1II, 10         V, 43,64-69         0.027         Very weak         2.6           1ibou         V, 35         35         0.068         Very weak								
4         Iargu Murey         III, 31-98         0.041         Very weak         4.1           IV, 106-109         V.8.87         0.031         Very weak         2.6           Sovata         IV, 5         25         0.021         Very weak         2.1           Sovata         IV, 132         0.023         Very weak         2.3           Târnăveni         II, 18-19         26         0.019         Very weak         2.3           Târgu Mureş         III, 22         48         0.027         Very weak         2.2           Târgu Mureş         IIII, 36         0.027         Very weak         2.2           V, 51-54         24         0.027         Very weak         2.0           1II, 36         0.027         Very weak         2.7           Ileanda         VII, 1         33         0.016         Very weak         2.7           Ileanda         VII, 1         33         0.016         Very weak         2.6           Cehu Silvaniei         II, 19-22         37         0.054         Very weak         6.8           Chu Silvaniei         I, 36-43         0.021         Very weak         2.3         0.022         Very weak         2.3		Târgu Mureş	Reghin		46			
5         Zalău         111, 31-98 IV, 106-109 V, 8-87         0.024 0.026         Very weak Very weak 3.1         4.1           VI, 46-55         0.021         Very weak 0.023         2.4           Sovata         IV, 5         2.5         0.021         Very weak 2.1         2.1           Târnăveni         II, 18-19         26         0.019         Very weak 2.2         2.5           Târgu Mureş         III, 22         48         0.027         Very weak 2.5         2.5           Târgu Mureş         III, 22         48         0.027         Very weak 2.7         2.7           Târgu Mureş         III, 22         48         0.027         Very weak 2.7         2.7           Târgu Mureş         III, 56         0.027         Very weak 2.7         2.7           III, 36         0.027         Very weak         2.7           Ileanda         VII, 1         33         0.016         Very weak         2.7           Ileanda         VII, 1         33         0.016         Very weak         2.7           Ilradu         II, 36-43         0.027         Very weak         2.6           Geubilvaniei         I, 36-43         0.029         Very weak         2.3 <t< td=""><td>4</td><td></td><td></td><td></td><td></td></t<>	4							
Kinescope         Vi, 8-87 Vi, 46-55         0.031         Very weak         3.1           Sovata         IV, 5         25         0.024         Very weak         2.4           Sovata         IV, 132         0.023         Very weak         2.1           Târnăveni         II, 18-19         26         0.019         Very weak         2.3           Târgu Mureş         III, 22         48         0.022         Very weak         2.2           Târgu Mureş         III, 36         0.022         Very weak         2.2           Târgu Mureş         III, 36         0.027         Very weak         2.2           Almaş         IV, 51-54         24         0.015         Very weak         1.6           Jibou         V, 35         35         0.068         Very weak         5.4           Jibou         V, 35         35         0.068         Very weak         5.4           Simleul         I, 36-43         0.023         Very weak         2.3           Geu Silvaniei         II, 27-29         37         0.054         Very weak         3.0           G.023         Very weak         2.3         0.023         Very weak         2.3           J. 77	•							
Image: space					_			
Sovata         IV, 5         25         0.021         Very weak         2.1           IV, 132         0.023         Very weak         2.3         0.023         Very weak         2.3           Târnăveni         II, 18-19         26         0.019         Very weak         2.5           III, 64         0.022         Very weak         2.2           Târgu Mureş         III, 22         48         0.027         Very weak         2.2           III, 36         0.02         Very weak         2.2         0.015         Very weak         2.0           III, 36         0.027         Very weak         2.0         0.027         Very weak         2.0           IIeanda         VII, 1         33         0.016         Very weak         2.7           Ileanda         VII, 1         33         0.016         Very weak         2.7           Ileanda         VI, 35         35         0.068         Very weak         2.6           Cehu Silvaniei         III, 19-22         37         0.054         Very weak         3.6           ITRSV Cluj         Municipal Bistriţa         I, 36-43         0.029         Very weak         2.9           I, 27-29         I, 90-96								
IV, 132         0.023         Very weak         2.3           Târnăveni         II, 18-19         26         0.019         Very weak         1.9           IV, 21         0.025         Very weak         2.5           Târgu Mureş         III, 22         48         0.027         Very weak         2.7           Târgu Mureş         III, 36         0.022         Very weak         2.7           Târgu Mureş         III, 36         0.022         Very weak         2.0           Almaş         IV, 51-54         24         0.015         Very weak         2.7           Ileanda         VII, 1         33         0.016         Very weak         2.7           Ileanda         VII, 1         33         0.016         Very weak         2.6           Gehu Silvaniei         III, 19-22         37         0.054         Very weak         5.4           Gilvaniei         I, 36-43         0.029         Very weak         2.9           I, 18-142         1, 77         0.031         Very weak         2.9           I, 52         I, 131-132         0.041         Very weak         2.9           0.029         Very weak         2.6         0.029         Very weak <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
Târnăveni         II, 18-19         26         0.019         Very weak         1.9           IV, 21         0.025         Very weak         2.5           III, 64         0.022         Very weak         2.2           Târgu Mureş         III, 22         48         0.027         Very weak         2.2           0.02         Very weak         2.7         0.02         Very weak         2.0           111, 36         0.02         Very weak         2.0         0.015         Very weak         2.0           111, 36         V, 43,64-69         0.027         Very weak         2.7         0.02         Very weak         2.0           1100         V, 43,64-69         0.027         Very weak         2.7         0.02         Very weak         2.7           1100         V, 35         35         0.068         Very weak         2.7           1100         V, 35         35         0.068         Very weak         6.8           Cehu Silvaniei         III, 19-22         37         0.054         Very weak         5.4           Silvaniei         I, 38-144         18         0.016         Very weak         2.9           1, 52         I, 52         0.029 </td <td></td> <td></td> <td></td> <td>25</td> <td></td> <td></td> <td></td>					25			
IV, 21         0.025         Very weak         2.5           Târgu Mureş         III, 22         48         0.022         Very weak         2.2           Târgu Mureş         III, 22         48         0.027         Very weak         2.7           Almaş         IV, 51-54         24         0.015         Very weak         2.7           5         Zalău         Almaş         IV, 51-54         24         0.015         Very weak         2.7           5         Zalău         İleanda         VII, 1         33         0.016         Very weak         2.7           1leanda         VII, 1         33         0.016         Very weak         1.6           1jibou         V, 35         35         0.068         Very weak         5.4           Şimleul         I, 44         18         0.016         Very weak         2.9           6         I, 36-43         I, 27-29         37         0.023         Very weak         2.3           6         I, 1, 27-29         I, 52         0.023         Very weak         4.9           1, 27-29         I, 52         0.026         Very weak         2.5           0.029         Very weak         2.6							,	
III, 64         0.022         Very weak         2.2           Târgu Mureş         III, 22         48         0.027         Very weak         2.7           III, 36         0.02         Very weak         2.7           III, 36         0.02         Very weak         2.7           III, 36         0.02         Very weak         2.0           III, 36         0.015         Very weak         2.0           III, 36         0.015         Very weak         2.7           III, 36         0.015         Very weak         2.0           IIII, 30         V, 43,64-69         0.015         Very weak         2.7           IIeanda         VII, 1         33         0.016         Very weak         2.7           Jibou         V, 35         35         0.068         Very weak         5.4           Simleul         I, 44         18         0.016         Very weak         2.9           I, 8-12         I, 90-96         I, 90-96         0.029         Very weak         2.9           I, 90-96         I, 131-132         0.029         Very weak         2.5           II, 54         II, 54         0.033         Very weak         2.5			Tärnäveni		26			
Târgu Mureş         III, 22         48         0.027         Very weak         2.7           III, 36         III, 36         0.02         Very weak         2.0           Almaş         IV, 51-54         24         0.015         Very weak         2.7           5         Zalău         Ileanda         VI, 43,64-69         0.027         Very weak         2.7           5         Zalău         Ileanda         VII, 1         33         0.016         Very weak         2.7           6         Jibou         V, 35         35         0.068         Very weak         5.4           6         Şimleul         I, 44         18         0.016         Very weak         2.9           6         I, 36-43         I, 27-29         37         0.023         Very weak         2.9           6         I, 8-12         I, 8-12         0.03         Very weak         2.3           1, 90-96         I, 52         II, 90-96         0.025         Very weak         2.9           1, 1, 1-2         II, 54         0.027         Very weak         2.5           0.027         Very weak         2.5         0.027         Very weak         2.5           1, 1, 1-2 <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td></td> <td></td>					_			
III, 36         0.02         Very weak         2.0           5         Zalău         Ileanda         IV, 51-54         24         0.015         Very weak         1.5           5         Zalău         Ileanda         VII, 1         33         0.016         Very weak         2.7           5         Zalău         Ileanda         VII, 1         33         0.016         Very weak         2.6           6         Zehu Silvaniei         IIII, 19-22         37         0.054         Very weak         5.4           6         Şimleul Silvaniei         I, 44         18         0.016         Very weak         2.9           7         ITRSV Cluj         Municipal Bistriţa         I, 36-43          0.023         Very weak         2.9           1, 138-144         18         0.016         Very weak         2.3         0.023         Very weak         2.3           1, 27-29         I, 90-96         I, 52         0.024         Very weak         2.9           1, 1, 131-132         I, 54         0.027         Very weak         2.5           0.027         Very weak         2.5         0.027         Very weak         2.5           1, 1, 12-2         0.					10			
Almaş         IV, 51-54         24         0.015         Very weak         1.5           5         Zalău         İleanda         VII, 1         33         0.016         Very weak         2.7           5         Zalău         İleanda         VII, 1         33         0.016         Very weak         1.6           6         Zehu Silvaniei         III, 19-22         37         0.054         Very weak         5.4           6         Çehu Silvaniei         II, 44         18         0.016         Very weak         2.9           6         I, 138-144         I         0.023         Very weak         2.9           1, 1, 19-22         I, 27-29         0.041         Very weak         2.9           0.023         Very weak         4.1         0.023         Very weak         2.9           1, 19-29         I, 90-96         I, 52         0.024         Very weak         2.9           0.025         Very weak         2.5         0.027         Very weak         2.6           1, 131-132         0.027         Very weak         2.5         0.027         Very weak         2.5           11, 1-2         0.027         Very weak         2.7         0.027			Targu Mureş		48			
Zalău         Ileanda         VI, 43,64-69         0.027         Very weak         2.7           5         Zalău         Ileanda         VII, 1         33         0.016         Very weak         1.6           5         Jibou         V, 35         35         0.058         Very weak         6.8           Cehu Silvaniei         III, 19-22         37         0.054         Very weak         5.4           Şimleul         I, 44         18         0.016         Very weak         2.9           6         I, 36-43         I, 138-144         0.03         Very weak         2.9           ITRSV Cluj         Municipal Bistriţa         I, 77         49         0.023         Very weak         4.1           0.041         Very weak         4.9         0.026         Very weak         2.9           I, 90-96         I, 90-96         I, 131-132         0.041         Very weak         2.6           II, 19-2         II, 19-2         0.027         Very weak         2.7           0.025         Very weak         2.7         0.027         Very weak         2.7           II, 19-2         II, 54         0.032         Very weak         3.2           0.043			A		24			
Ileanda         VII, 1         33         0.016         Very weak         1.6           Jibou         V, 35         35         0.068         Very weak         6.8           Cehu Silvaniei         III, 19-22         37         0.054         Very weak         5.4           Şimleul         I, 44         18         0.016         Very weak         5.4           Silvaniei         I., 36-43         0.016         Very weak         2.9           ITRSV Cluj         Municipal Bistriţa         I, 38-144         0.03         Very weak         2.9           I, 77 - 29         I, 77-29         49         0.023         Very weak         4.1           0.029         Very weak         4.1         0.014         Very weak         4.1           I, 90-96         I, 152         0.021         Very weak         2.9           I, 1, 131-132         I, 1, 131-132         0.025         Very weak         2.5           II, 54         0.027         Very weak         2.7           ITRSV Oradea         Ardud R.A.         IV, 5-42         0.043         Very weak         3.2           ITRSV Oradea         Ardud R.A.         IV, 1-3         43         0.037         Very weak <t< td=""><td></td><td></td><td>Almaş</td><td></td><td>24</td><td></td><td></td><td></td></t<>			Almaş		24			
5         Zalău         Jibou         V, 35         35         0.068         Very weak         6.8           Cehu Silvaniei         III, 19-22         37         0.054         Very weak         5.4           Şimleul         I, 44         18         0.016         Very weak         1.6           6         I., 36-43         I., 138-144         0.03         Very weak         2.9           ITRSV Cluj         Municipal         I., 27-29         0.041         Very weak         2.3           I., 90-96         I., 52         0.014         Very weak         2.9           I., 131-132         I., 12-2         0.029         Very weak         2.9           0.026         Very weak         2.9         0.029         Very weak         2.9           I., 177         H         49         0.041         Very weak         2.9           0.026         Very weak         2.5         0.025         Very weak         2.5           II, 1-2         0.032         Very weak         2.7           0.032         Very weak         3.2         7           7         ITRSV Oradea         Ardud R.A.         IV, 5-42         0.043         Very weak         3.7 <td></td> <td></td> <td>The second se</td> <td></td> <td>22</td> <td></td> <td></td> <td></td>			The second se		22			
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Silvaniei         I, 36-43         0.029         Very weak         2.9           6         I, 138-144         0.03         Very weak         3.0           ITRSV Cluj         Municipal Bistriţa         I, 27-29         49         0.041         Very weak         4.1           0.049         Very weak         4.9         0.029         Very weak         4.1           0.041         Very weak         4.9         0.029         Very weak         4.9           1, 90-96         I, 90-96         0.026         Very weak         2.9           1, 131-132         0.025         Very weak         2.5           II, 1-2         0.027         Very weak         2.5           0.032         Very weak         3.2           7         ITRSV Oradea         Ardud R.A.         IV, 5-42         0.043         Very weak         4.3								
ITRSV Cluj         Municipal Bistriţa         I, 138-144         0.03         Very weak         3.0           I, 8-12         I, 8-12         0.023         Very weak         2.3           0.041         Very weak         4.1           0.029         Very weak         2.9           0.026         Very weak         2.6           0.027         Very weak         2.5           0.027         Very weak         3.2           0.032         Very weak         3.2           0.032         Very weak         3.2           0.043         Very weak         4.3           0.037         Very weak         3.7					18			
ITRSV Cluj         Municipal Bistriţa         I, 8-12 I, 27-29         0.023         Very weak         2.3           0.041         Very weak         4.1           0.049         Very weak         4.9           0.029         Very weak         2.9           0.025         Very weak         2.6           0.025         Very weak         2.5           0.027         Very weak         2.5           0.027         Very weak         2.5           0.027         Very weak         2.7           0.025         Very weak         2.7           0.027         Very weak         2.7           0.027         Very weak         2.7           0.027         Very weak         2.7           0.027         Very weak         2.7           0.032         Very weak         3.7           1TRSV Oradea         Ardud R.A.         IV, 1-3         43	6				_			
ITRSV Cluj         Municipal Bistriţa         I, 27-29         49         0.041         Very weak         4.1           0.041         Very weak         4.9         0.049         Very weak         4.9           0.029         Very weak         2.9         0.026         Very weak         2.9           0.025         Very weak         2.5         0.025         Very weak         2.7           0.032         Very weak         3.2         0.032         Very weak         3.2           7         ITRSV Oradea         Ardud R.A.         IV, 5-42         0.043         Very weak         4.3					4			
ITRSV Cluj         Municipal Bistrița         I, 77         49         0.049         Very weak         4.9           0.029         Very weak         2.9         0.026         Very weak         2.9           1, 131-132         0.025         Very weak         2.5           1I, 1-2         0.027         Very weak         2.7           0.032         Very weak         3.2           7         ITRSV Oradea         Ardud R.A.         IV, 1-3         43         0.037         Very weak         4.3					4			
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I, 131-132         0.025         Very weak         2.5           II, 1-2         0.027         Very weak         2.7           II, 54         0.032         Very weak         3.2           7         ITRSV Oradea         Ardud R.A.         IV, 1-3         43         0.037         Very weak         3.7			Distriga		4			
II, 1-2         0.027         Very weak         2.7           II, 54         0.032         Very weak         3.2           IIV, 5-42         0.043         Very weak         4.3           IIRSV Oradea         Ardud R.A.         IV, 1-3         43         0.037         Very weak         3.7					-1		,	
II, 54         0.032         Very weak         3.2           7         ITRSV Oradea         Ardud R.A.         IV, 5-42         0.043         Very weak         4.3           7         ITRSV Oradea         Ardud R.A.         IV, 1-3         43         0.037         Very weak         3.7					4		· · · · · · · · · · · · · · · · · · ·	
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IV, 48-52 0.085 Very weak 8.5		TIRSV Oradea	Ardud R.A.		43			
					-			8.5

**Conclusions and Recommendations**. The studies and analyses conducted in the Transylvanian deciduous forests have shown that the most affected forest formations are those of oaks. Beech forests and especially pure forests are rarely affected by pests and even less by defoliating insects.

Here we can steel recall that in the case of the Forest District Ulmeni, the Forestry Department Baia Mare was observed a gradation of the defoliator *Lymantria* 

*dispar* in the pure beech stands in the spring of 2007, but was stopped after the application of an AVIO treatment.

The analyzed defoliators *Lymantria dispar* and *Tortrix viridana* are in gradation in all the studied forest formations in most cases but without producing significant defoliations, except for the trees located within the Forestry Department Satu-Mare, the Forest District Carei and the Forest District Livada.

The laboratory analysis performed at ICAS Cluj Research Station show that setting the forecasting for the main forestry defoliators is absolutely necessary and must be carried out every year, and that through the proposed measures is maintained the integrity and stability of the forest stands.

The indirect density determination of the defoliating populations can be performed with sufficient precision in the egg stage from the qualitative analysis of the *Lymantria dispar* eggs and from the sequential analyses of *Tortrix viridana*.

Long-term forecasting for the populations evolution of the two defoliators can be achieved by creating a system of permanent monitoring networks with variable density (between about 30 and approx. 300-500 ha), according to the history of attacks, the degree of forest stands fragmentation, phytosanitary and vegetation estate, the particularities of the climate regime.

Besides the defoliators for which was conducted the forecast in 2014, it also presents a gradations risk in the studied area *Euproctys chrissorhoea*, *Malacosoma neustria* and various species of *Geometridae*.

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Romică Tomescu, Institutul de Cercetări și Amenajări Silvice (ICAS) București (Filiala Cluj), 65 Horea Street, Cluj-Napoca, Romania, EU.

Ioan Tăut, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Calea Mănăștur Street, Cluj-Napoca 400488, Romania, EU, e-mail: ioan\_taut90@yahoo.com

Vasile Şimonca, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Calea Mănăştur Street, Cluj-Napoca 400488, Romania, EU.

Ilie Covrig, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, 3-5 Calea Mănăştur Street, Cluj-Napoca 400488, Romania, EU.

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