

# A STUDY UPON THE EVOLUTION OF THE PESTS ON THE TRUNK AND THE BARK WITHIN THE FRAME OF THE FOREST DIRECTION SIBIU, IN THE YEAR 2017

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**Abstract:** During the year 2017 from the forest surface of 119.000 ha managed by the Forest Direction Sibiu was affected by the attack of the Coleoptera pests on the trunk and the barks, a surface of 115,90 ha. A part of 85% there is on the ray of the Forest Ranch Miercurea Sibiului. Among the signaled pest were *Hylobius abietis* and *Ips typographus*. The bark pests of the resinous trees they were signaled within the frame of the Forest Direction Sibiu all the year. The record, the observations and the monitoring were made in the different evolutions stages, but also after the wound characteristic. The adults were observed during the flight, the change of places, on the trees trunks searching a place to gnaw the orifice to enter into the bark.

**Keywords:** pest, traps, Forest Direction Sibiu, *Hylobius abietis*, *Ips typographus*

## INTRODUCTION:

*Hylobius abietis* (L.) (Coleoptera: Curculionidae), (the large pine weevil) the pest of the spruce fir saplings, is considered the most important pest of the coniferous trees forests in Europe, Asia, Far East and Japan. The species was signaled in Europe still in the XIX century being present in all the spruce fir forests where are made exploitations and regenerations (Dillon et. al., 2006). The pest attacks the resinous saplings, mostly the spruce fir forests with the age of 2-5 years (Olenici et.al., 2005). The appearance of the pest was signaled in the coniferous forests in the place with a total cutting and the imediate afforestation where the pest produces the damages, at the new cultures. So, it requires some control measures of the pest population and the forest protection. Unlike the majority of the forest pests, this species can live as adults till the 2 and 3 years (Heritage and Moore, 2001, Olenici and Olenici, 2006).

The adults has 1,5 cm length, a brown colour and they are active from March to October when the density of the populations could be reach 100.000 samples/ha (Dillon et. al., 2008). This fact influences the level, the structure and the dynamic of the beetles populations, and also the proportion of the damages. The adults gnaw the bark on the trunks of the saplings in form of an island and through these wounds it take place an abundant leaking of resin ( Olenici et. al., 2007).

Sometimes the adults can gnaw even the bark of the thin branches of the older trees. Surviving of a much procent of beetles for 2-3 years after the adults eclosion determined a superposition of the generations and so, an increase of the number of the adults (Olenici and Olenici, 2003). In order to survive and for reproduction, the older and younger beetles feed all the time of the vegetation season gnawing mainly the bark of the saplings. The females are attracted by the smell of the fresh cutted wood and they lay down the eggs in

the splits. The larvae produce wounds in the roots of the stumps and they don't present a danger (Day and Salisbury, 1999).

*Ips typographus* (Coleoptera: Curculionidae) (the big beetle of the spruce fir bark). This pest is present both in the pure spruce fir forests, and also in the mixture forests with other resinous species (Bucșa and Curtean, 1996, Antonie, 2015). The attacks the spruce fir and sometimes also the pine and other resinous species. They are attacked the trees with ages between 60-100 years old and less the young trees. It was signaled the presence and the multiplication in mass of the pest in the zones with fallen, broken and physiological weakened trees. The healthy attacked trees begin to weak. In conditions of our country, the species has 2 generations yearly and hibernate as adults in the trunk of the infested trees (Bucșa, 1997, 2002, Antonie, 2015).

A less percent hibernates in the stage of the egg, larva or pupa. The trees are attacked in the zone with a diameter between 9 and 40 cm. On the wood surface, the adults and larva gnaw galleries. The finding the attack is made on the base of the appearance green-grey-pale of the trees. In time the colouring becomes yellow, reddish and at the end the trees dry. This colour changing beginn in the top of the tree and gets down towards base (Bucșa, 2004). As a result of the attack on observe a bark exfoliation, at 2-3 months after the adults installation beginning with the middle of the trunk, progressing up and down.

## MATERIALS AND METHODS:

The traps used for limitation of these pest populations were barrier type made from a plastic panel, under that was installed the drain pipe for the adults. The panel had the measures 50/50 cm and the drain pipe with the length of 50-60 cm, the breadth of 20-30 cm and the height of 15-20 cm. In this drain pipe was a constant level of water (approximat half of the

volume). The pheromon lure was installed over the panel and traps was collected 2-3 times, in a week with the captured adults, that could enter into the decaying and could reduce considerable the pheromon efficiency (Olenici and Olenici, 2002).

In the frame of the Forest Direction Sibiu (Fig.1.)

was used the pheromonal method to attract and capture of the adults. In order to control the *Ips typographus* species in the affected zones during the year 2017 was used a number of 3550 pheromonal traps (2768 Atra Typ traps and 782 Atra Chalc traps) that were placed as pheromonal traps barrier type.



Fig. 1. The Forest District Miercurea Sibului map (original)

In order to capture the beetles at the Forest Direction Sibiu were placed 8.975 classic trap trees, 1.795 traps type (X5) with Atra typ and Atra Chalc pheromons that are equivalent with 8.975 trap classic trees (Fig. 2).

The points of capture was placed in the zones affected by wind, or snow with fallen, broken trees, the zones in exploitation with 3-4 years old with wounded trees, the forests physiological weakness, wounded by wind, swampy, polluted, a forest affected in a

significant weight by pest (Stancă-Moise, 2014, 2016, Stancă-Moise and Blaj, 2017a). The placing of these traps was made in skirts, clearings, in the forest, at the distance of 10-30 m from the edge of the forest. They were installed before the beginning of the insects flight (the end of the month March- the beginn of the month April). The collecting points was disposed on the all studied surface, from point of perimeter, height, and exposition (Stancă-Moise C, 2017b, 2018a,b).

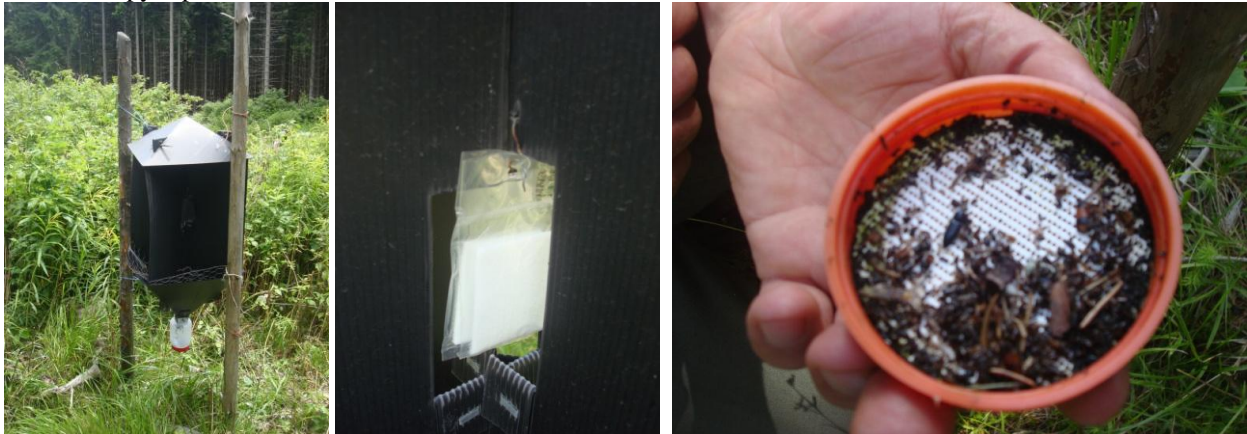


Fig. 2. Pheromone traps for the control of bark beetle populations (original)

**RESULTS AND DISCUSSION:**

The monitoring in order to control the pest populations of the bark pest *Hylobius abietis* (L.) was observed that the infestation varied from very poorly to moderate, being used 3.550 pheromonal traps (2.768 Atra Typ traps and 782 Atra Chalc traps).

In the surfaces already planted in the previous years, they were placed the pheromonal traps at the end of the Mai month. The results were good, being find a maximum percent of 10-15% attacked saplings.

At the plantations made in spring of the year 2017 depending on the estimation of the attack degree of every surface, were placed in the same time with the saplings, also the treatments.

In order to protect the saplings, they were bath before the plantation in a solution of Mospilan 0,5%. This treatment ensured the protection of the saplings for a period of approximate a month, with very good results in the plantations made after two years from the forest exploitation (Table 2,3).

Tab. 1.

The Resinous forests attacked by *Ips typographus* in the frame of the Forests Direction Sibiu, in 2017

Bark pests									
Production unit	Forest lot	u.a./Groups u.a./sp.	Surface (ha)	Composition (the species in crop)	Age	Infested surface in 2017 ha	Infested surfaces in 2017 currently	The intensity of infestation in 2017	The intensity of infestation in 2017 currently
Forest Ranch Arpaş	I	64-68,127-138,10,18-22,136b,14g,22c,204a,205a	449	10mo	80-140	202	50	M-P	S-P
Forest Ranch Porumbacu	I	19h,20a,21a,11	51.2	10 Mo	35-135	2.3	0.7	M-P	S-M

Avrig		9a							
Forest Ranch Miercurea S	I Tilișca	2,3,4-38	180	10 Mo	20-120	136	136	<b>M</b>	<b>M</b>
Forest Ranch Sibiu	I, II	32-37,49-54,55-58,120-130,152-155	230.9	10 Mo	70-120	155	230.9	<b>S</b>	<b>P</b>
Forest Ranch Săliște	I	25-58,40b, 45-58,77h	250	10 Mo	60-120	138	212	<b>M</b>	<b>M</b>
<b>Total</b>			<b>1161,1 ha</b>			<b>633,3 ha</b>	<b>629,6</b>		
<b>Total Insects</b>			<b>1574,03 ha</b>			<b>695,2 ha</b>	<b>682,30 ha</b>		

**Abbreviations:** ha- hectare; **S-** weak attack (11-25%); **M-** middle attack (26-50%); **P-** strong attack (51-75%).

Tab. 2.

The Resinous forests attacked by *Hylobius abietis* (L.) in the frame of the Forests Direction Sibiu, in 2017

<i>Hylobius abietis</i>									
Production unit	Forest lot	u.a./Groups u.a./sp.	Surface (ha)	Composition (the species in crop)	Age	Infested surface in 2017 ha	Infested surfaces in 2017 currently	The intensity of infestation in 2017	The intensity of infestation in 2017 currently
Forest Ranch Avrig	I Porumbacu	33c	0,3	10Mo	1	0,3	0	<b>Fs</b>	
Forest Ranch Miercurea	I Tilișca	1-15	26,4	8Mo2La	1-5	18,3	12	<b>Fs</b>	<b>Fs</b>
Forest Ranch Sibiu	I, II	10-37,49-58,120-130,152-155	21,4	10 Mo	1-3	10,1	4,1	<b>S</b>	<b>S</b>
Forest Ranch Saliste	Poplaca	43,29,42d,75b,46b	9,5	10Mo	2	8	8	<b>M</b>	<b>M</b>
<b>Total</b>			<b>57,6</b>			<b>28,7</b>	<b>24,1</b>		

**Abbreviations:** Mo-spruce; La-larch; **Fs-** very weak attack (1-10%); **S-** weak attack (11-25%); **M-** middle attack (26-50%).

Tab. 3.

The surface infested by *Hylobius abietis* (L.)

Nr. Crt.	Forest Ranch	<i>Hylobius abietis</i> (L.)	
		With treatments in 2017 (ha)	Stipulated with treatments in 2018
1	Avrig	0.0	0.0
Total Forest Ranch Avrig		0.0	0.0
2	Miercurea Sibiului	12.0	12.0
Total Forest Ranch Miercurea Sibiului		12.0	12.0
3	Sibiu	10.1	10.1
Total Forest Ranch Sibiu		4.1	10.1
4	Forest Ranch Săliște	8.0	14.2
T O T A L Forest Direction		24.1	36.3

Tab. 4.

The prognosis of the *Ips typographus* attack in the resinous forests in the spring of the year 2018

Nr. Crt	The place name	Production unit/ Groups	The resinous forests surface (ha)		The density of population	Trees infested (trees)		Nr. Trap trees		The trap and the control trees monitorized		
			Total	Infested		Nr. exemplars	I	II	I	II	Control trees	From which
					Trap trees (I+II)							Total (Col.11 + Col.12)
1	2	3	4	5	6	7	8	9	10	11	12	13
<b>Forest Ranch Arpaș</b>												
1	I OPREA	64-68	152	3	2538	0	30	0	60	0	60	60
2	I VISTIȘOARA	10,18-22	178	35	1354	0	130	0	260	0	260	260
3	I STREZA	136B	17	1	2451	0	0	0	0	0	0	0
4	I ORBAN	127-138	80	8	1287	0	5	0	10	0	10	10
5	I MĂRGINENI	14G,22C,204A,205A	22	3	2871	0	0	0	0	0	0	0
<b>Total</b>			<b>449</b>	<b>50</b>		<b>0</b>	<b>165</b>	<b>0</b>	<b>330</b>	<b>0</b>	<b>330</b>	<b>330</b>
<b>FOREST RANCH AVRIG</b>												
2	BRANIȘTE	19H,20A,21A	14.9	0.6	953	0	9	0	9	0	9	9

3	SĂRATA	119A	36.3	0.1	541	10	0	2	0	0	2	2
<b>Total</b>			<b>51.2</b>	<b>0.7</b>		<b>10</b>	<b>9</b>	<b>2</b>	<b>9</b>	<b>0</b>	<b>11</b>	<b>11</b>
<b>FOREST RANCH MIERCUREA SIBIULUI</b>												
1	UB I TILIȘCA	1-38	180	136	1158	45	78	11	78	0	89	89
<b>Total</b>			<b>180</b>	<b>136</b>		<b>45</b>	<b>78</b>	<b>11</b>	<b>78</b>	<b>0</b>	<b>89</b>	<b>89</b>
<b>FOREST RANCH SIBIU</b>												
1	I FLOARE A	32- 34,35- 37	42.3	42.3	1897	95	7	32	14	0	46	46
2	CĂPRĂR EȚI	49- 54,55- 58	98.6	98.6	2120	78	12	26	24	0	50	50
3	II GÂRCU	120- 130	42.8	42.8	2312	39	8	13	16	0	29	29
4	FĂRCAȘ U	152- 155	47.2	47.2	2076	59	4	20	8	0	28	28
<b>Total</b>			<b>230.9</b>	<b>230.9</b>		<b>271</b>	<b>31</b>	<b>91</b>	<b>62</b>	<b>0</b>	<b>153</b>	<b>153</b>
<b>FOREST RANCH VALEA CIBINULUI SALIȘTE</b>												
1	POPLAC A	25-58, 40B	200	181	1031	489	0	122	0	0	122	122
2	TILIȘCA	45- 58,77H	50	31	1125	278	0	70	0	0	70	70
<b>Total</b>			<b>250</b>	<b>212</b>		<b>767</b>	<b>0</b>	<b>192</b>	<b>0</b>	<b>0</b>	<b>192</b>	<b>192</b>
<b>TOTAL</b>			<b>1161.1</b>	<b>629.6</b>		<b>1093</b>	<b>283</b>	<b>296</b>	<b>479</b>	<b>0</b>	<b>775</b>	<b>775</b>

## CONCLUSIONS:

In the year 2017 in the frame within the Forest Direction Sibiu, by the collecting made with the 3550 phomonal traps resulted 17.574 collected specimens of *Ips typographus* data presented in the Table 1. After the synthesis the interpretation and the analysis of the captures it comes out the following: the most numerous samples were taken in the Ranch Forest Arpaș (449 collected specimens) followed by Forest Ranch Săliște (250 collected specimens), Ranch Forest Sibiu (231 collected specimens), Ranch Forest Miercurea Sibiului (180 collected specimens) and Ranch Forest Avrig (51 collected specimens).

Although the abundance of the captures and medium number of insects/trap is different from a zone to another, the degree of infestation is a powerful one. The earliest captures proceed from April month, the maximum number was in June, July months and the latest in September month.

The degree of attack of this pest after the study conducted in 2017 can be considered an average attack (26-50%) in Ranch Forest Avrig, Ranch Forest Miercurea Sibiului and Ranch Forest Saliste, while in Ranch Forest Arpas and Ranch Forest Sibiu the attack

was a strong one because the infested surface being in the of 51-75%.

The evolution of the captures number on months is the same in all five Forest Ranches within the frame of Forest Direction Sibiu and the prognosis of the *Ips typographus* attacks for the year 2018 is presented in the Table 4.

After the researches I ascertained the fact that the captures were dependent on the general evolution of the flight, on the regimen of the climate factors of the year 2017, but also on the place of the traps. The difference from a point to another were in connection with the local conditions of every Ranch. As preventive measures for infestation of *Ips typographus* in the forest, broken and fallen trees were put in value, bided and removed in the terms stipulated in the exploitations licences with the respect of the forest rules.

In attack of the bark pest *Hylobius abietis* (L.) was signalled on a surface of 57,6 ha in the following production units: Porumbacu, Tilișca, Sibiu I,II, Poplaca, belong to the Forest Direction Sibiu where the attack degree was of 41,84%, which can be interpreted as having an average attack on this pest. In order to avoid the attack of *Hylobius abietis* the saplings were



treated with Mospilan. It was used a quantity of 97,90 Kg insecticide for the treatment of 1.958 thousands saplings that were planted in the spring of this year.

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