Forster, B.; Knížek, M.; Grodzki, W. (eds.) 1999: Methodology of Forest Insect and Disease Survey in Central Europe. Proceedings of the Second Workshop of the IUFRO WP 7.03.10, April 20–23, 1999, Sion-Châteauneuf, Switzerland. Birmensdorf, Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) 154-157.

SAWFLY-GRADATION IN PINE STANDS IN CARINTHIA – DIFFERENT METHODS OF MONITORING

Hannes Krehan
Federal Forest Research Centre Vienna; Institute of Forest Protection

Introduction:

The recent gradation of the European pine sawfly *Neodiprion sertifer* in Carinthia (between Völkermarkt and Klagenfurt) started in 1995 in a total area of about 2500 ha. Meanwhile the infested area grew up to more than 5000 ha (about 400 ha of it heavily damaged). The infested pines (most of them Scots pines) grow in secondary stands (often mixed with spruce, larch, oak and beech) between 400 and 600m altitude.

The typical symptoms of older needle feeding by the *Neodiprion* larvae, which can be best seen during the second half of May, were observed first on older trees (60-100 years). In younger stands of *Pinus sylvestris* extensive damage on the needles were reported only in the following years.
This phenomenon is not typical for *Neodiprion* infestations in our country. The fox headed pine sawfly is known to be a pest of 20 to 30 years old pine afforestations and not of old trees.

The same area was already attacked by *Neodiprion sertifer* from 1960 to 1965. At that time *N. sertifer* was associated by *Gilpinia pallida*.
A very interesting fact is also the long duration of the gradation. *N. sertifer* outbreaks usually last 2-3 years, before the density drops to an uncritical level of less than 1-3% of the peak level. In the most cases the reason for the rapid break down of the gradation is the polyhedrosis-virus *Borrelinavirus diprionis*. But also parasitoids (cocoon parasitoids) reduce the sawfly population.
In order to get some information about the intensity of the sawfly-attack in the different parts of the infested area and to get data for making predictions about the expected attack in the following year, we tried to install a kind of monitoring system in 1997.

Method:

The following monitoring methods have been applied on 28 sample plots:

Egg masses collecting in December

Number of egg masses found on the needles of a fresh cut tree (4 persons searching within 30 minutes). Each egg mass consisted between 40 and 140 eggs.

Defoliation assessment in July

Documentation of the damage caused by the feeding of the sawfly larvae on the pines and the spreading in the infested area. 3 damage classes: 1…slight, 2…medium and 3…heavy damage.

Cocoon analysis in August

Differentiation between healthy and parasited or old (opened) cocoons collected in the litter close to the infested trees. The numbers cited in the table refer to 1 square meter of soil surface.

Pheromone trapping in the autumn

Different types of pheromone traps have been used: Lund-trap from Sweden (Olle Andebrant), Delta traps and sticky boards in different colours (yellow, white, blue). The baits

(pheromone) were produced in Sweden (University Lund). On some sample plots a comparison of the different types of traps was carried out.

Results:

(Table 1, and table 2)

Although most of the experts expected that the *Neodiprion*-outbreak in this area should break down after 3 to 4 years from natural causes, there is no indication that it has been or will be so in reality. The frass activity and sometimes also the numbers of healthy cocoons have been reduced in some places in the centre of the infested area (VN3, VN4, VN7) but from the data of the monitoring system nothing else verifies the breakdown of the gradation.

In the district of Klagenfurt the spread in the Western direction seems to go on rapidly, but also in some random parts of Völkermarkt we collected high numbers of healthy cocoons (VN15: 124) or high numbers of egg masses (VN14: 70).

The numbers of males caught in the pheromone traps varies from 22 to 1077. In some cases there is a good correlation between trap catches and healthy cocoons but in other cases there is really no correlation.

The interpretation of the collected egg masses in comparison with other monitoring data seems to be very difficult at the moment. In one case (VN4) really no eggs could be found on the needles of the first cut tree and only 3 egg masses on another tree in the surrounding. But a high number of *Neodiprion* males in the traps and medium defoliation have been registered.

The differences in the catch rate between the tested traps are not very high and depend on the site where the trap is fixed.

sample plot	Eggmass Dez 97	Eggmass Dez 98	healthy cocoons Aug 97	healthy cocoons Aug 98	total trap catches 3.9.-23.11.1998	trap type	infestation degree 1998
VN 1			0	8	323		1
					100%	VN1 FT gelb-weiß	
VN 2	33	6	20	88	295		1
					100%	VN2 FT gelb	
VN 3	44	2	112	36	675		2
					100%	VN3 FT gelb-weiß	
VN 4		0(3)	76	20	712		2
					40%	VN4 FT gelb	
					60%	VN4 Delta W	
VN 5			4	4	266		1
					100%	VN5 Delta W	
VN 6			0	12	347		1
					100%	VN6 Delta W	
VN 7	12	25	48	36	131		3
					67%	VN7 Delta W	
					33%	VN7 Lund	
VN 8			0	0	213		1
					100%	VN8 Delta W	
VN 9		0	0	0	215		1
					100%	VN9 Delta W	
VN 10		2	0	4	142		1
					100%	VN10 Delta W	
VN 11				0	160		1
					100%	VN11 Delta W	
VN 12				0	22		1
					100%	VN12 Delta W	
VN 13				12	335		1
					100%	VN13 FT gelb	
VN 14		70		44	144		3
					100%	VN14 Lund	
VN 15		26		124	538		1
					27%	VN15 FT gelb	
					41%	VN15 FT weiß	
					12%	VN15 FT blau	
					20%	VN15 Lund	
VN 16				0	172		1
					100%	VN16 Delta W	

Table 1:

Neodiprion sertifer - monitoring

BFI Völkermarkt

Infestation degree: 1...slight damages, 2... medium damages, 3...heavy damages

types of pheromone traps

FT gelb = sticky board yellow 20x28 cm
FT weiß = sticky board white 20x28 cm
FT blau = sticky board blue 20x28 cm
Lund = Lund trap
Delta W = Delta trap transparent (10x20cm)

sample plot	Eggmass Dez 97	Eggmass Dez 98	healthy cocoons Aug 97	healthy cocoons Aug 98	total trap catches 3.9.-23.11.1998	trap type	infestation degree 1998
KN 1	21	12	96	56	**608**		3
					100%	KN1 Lund	
KN 2			12	124	**390**		2
					100%	KN2 Lund	
KN 3	27	6	104	148	**640**		3
					39%	KN3 Lund	
					23%	KN3 FT gelb	
					25%	KN3 FT weiß	
					13%	KN3 FT blau	
KN 4	6	9	48	200	**1077**		1
					68%	KN4 Lund	
					32%	KN4 Delta W	
KN 5		15	12	284	**611**		1
					28%	KN5 Lund	
					13%	KN5 FT gelb	
					45%	KN5 FT weiß	
					15%	KN5 FT blau	
KN 6			76	60	**785**		3
					49%	KN6 Lund	
					51%	KN6 Delta W	
KN 7			8	32	**589**		1
					100%	KN7 FT gelb	
KN 8			0	0	**580**		1
					100%	KN8 Delta W	
KN 9				4	**341**		1
					100%	KN9 FT gelb	
KN 10				20	**341**		1
					100%	KN10 FT gelb	
KN 11				4	**184**		1
					100%	KN11 Delta W	
KN 12		14		96	**460**		1
					17%	KN12 Lund	
					41%	KN12 FT gelb	
					19%	KN12 FT weiß	
					22%	KN12 FT blau	

Table 2:

Neodiprion sertifer - monitoring BFI Klagenfurt

Infestation degree: 1...slight damages, 2... medium damages, 3...heavy damages

Types of pheromone traps

FT gelb = sticky board yellow 20x28 cm
FT weiß = sticky board white 20x28 cm
FT blau = sticky board blue 20x28 cm
Lund = Lund trap
Delta W = Delta trap transparent (10x20cm)