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Abstract

Proceedings of the Second Meeting of Forest Protection and Forest Phytosanitary Specialists, November 27-28, 2007, Vienna, Austria

Facing increasingly problems with both native pests and diseases and also invasive species, forest health specialists from Central Europe had the idea of a meeting within a very tight time schedule allowing more time for discussions and informal talks. In the light of the valuable experience of 2006, the Second Meeting of Forest Protection and Forest Phytosanitary Specialists was held from 27 to 28 November 2007 in Vienna, Austria at the Federal Research and Training Centre for Forests, Natural Hazards and Landscape (German abbr.: BFW). 41 participants from 12 Central, South and North European countries took the opportunity for an exchange of information. Papers of the oral presentations are provided in this issue.

Content

Preface

Between 27 and 28 November 2007 the Second Meeting of Forest Protection and Phytosanitary Specialists was held in Vienna at the Federal Research and Training Centre for Forests, Natural Hazards and Landscape (German abbr.: BFW). Increasing problems with native pests and diseases in many European countries were reviewed in connection with decreasing resources and a reduced number of specialists within these fields. Furthermore, the meeting aimed to bring together specialists from many European countries to discuss issues such as risk assessment, eradication programs, compilation of information, to propose and coordinate future activities, including research networks or common projects, possibilities of knowledge transfer, the mutual use of expensive laboratory equipment, and collections.

More than 41 experts from 12 European countries discussed actual forest protection problems, unknown abiotic and biotic damages in different tree species and the current situation about invasive species in their countries.

All participants agreed that this kind of meeting was very useful and should be repeated soon. Especially the possibility of quick dissemination of information on new problems and the actual forest protection and phytosanitary situation are of great value for all colleagues working in the same field.

Christian Tomiczek

The Storm "Gudrun" and the Spruce Bark Beetle in Sweden

Åke Lindelöw and Martin Schroeder

Abstract

Monitoring of the spruce bark beetle involving pheromone trap catches and beetle-killed trees has been performed since 1995. After the storm fellings of 2005 and 2007 the monitoring was expanded from four to 34 areas (10000-40000 ha). Trap catches increased substantial in the region affected by the storm compared to moderate catch levels outside this region. High catch levels in most areas did not correspond to an expected high level of damage. The number of killed trees decreased from 14/km in 2006 to 7/km in 2007. The impact of weather and remaining wind-felled spruces in the forest on trap catches and damage level is discussed.

Keywords: Monitoring, *Ips typographus,* pheromone trap, spruce bark beetle, storm-felling

Kurzfassung

Der Sturm "Gudrun" und Fichtenborkenkäfer in Schweden

Über die Entwicklung des Buchdruckers geben Pheromonfallen-Fänge sowie die Zahl an Borkenkäferfichten Auskunft. Dieses Monitoring wird seit 1995 in vier verschiedenen Gebieten durchgeführt. Nach den Sturmschäden in den Jahren 2005 und 2007 wurde das Monitoringprogramm von vier auf 34 Gebiete (10000-40000 ha) erweitert. Die Fangzahlen der Pheromonfallen im Windwurfgebiet stiegen beträchtlich. Außerhalb waren sie nicht erhöht. Die hohen Fangzahlen fast aller Gebiete korrelierten nicht mit dem erwarteten hohen Schadensausmaß. 2006 wurden 14 Fichten je Kilometer Bestandesrand vom Buchdrucker befallen, 2007 verringerte sich diese Kennziffer auf sieben pro Kilometer. Der Einfluss von Wetter und im Wald belassenem Windwurfholz auf Fangzahlen sowie das Schadensausmaß werden diskutiert.

Schlüsselworte: Überwachung, *Ips typographus*, Pheromonfalle, Buchdrucker, Windwurf

In January 2005 about 75 million m³ of trees, mainly Norway spruce, were felled by wind in southern Sweden (Figure 1). In addition, 12 million m³ were felled by the storm "Per" in early 2007 in approximately the same area (Figure 2). Salvage logging has been intense but several tenths of million m³ of spruce remained in the forest during the first summer. Also in the second summer millions of m³ were still lying in the forest. Large quantities of timber have been stored and are still stored and sprinkled with water (Figure 3). Many downed trees

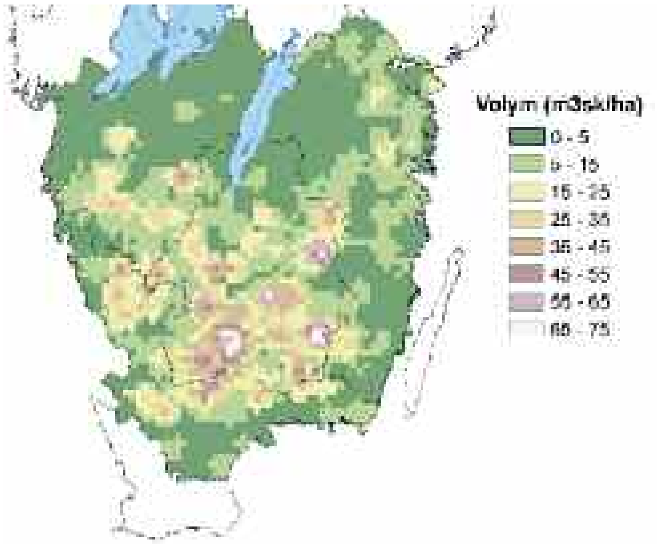

Figure 1: Areas damaged by "Gudrun" in January 2005
Abbildung 1: Durch "Gudrun" im Jänner 2005 geschädigte Flächen

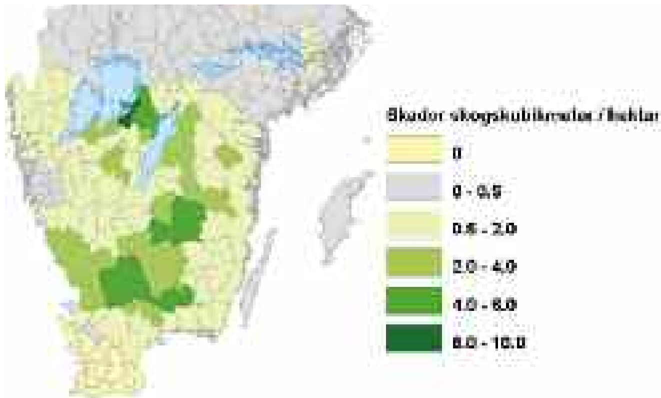

Figure 2: Number of m³/ha felled by "Per" in January 2007
Abbildung 2: Windwürfe durch "Per" im Jänner 2007 in fm/ha

Figure 3: Byholma 31 May 2007: 1 million m³ of timber, sprinkled with water
Abbildung 3: Byholma am 31. Mai 2007: 1 Million Festmeter nassgelagertes Holz

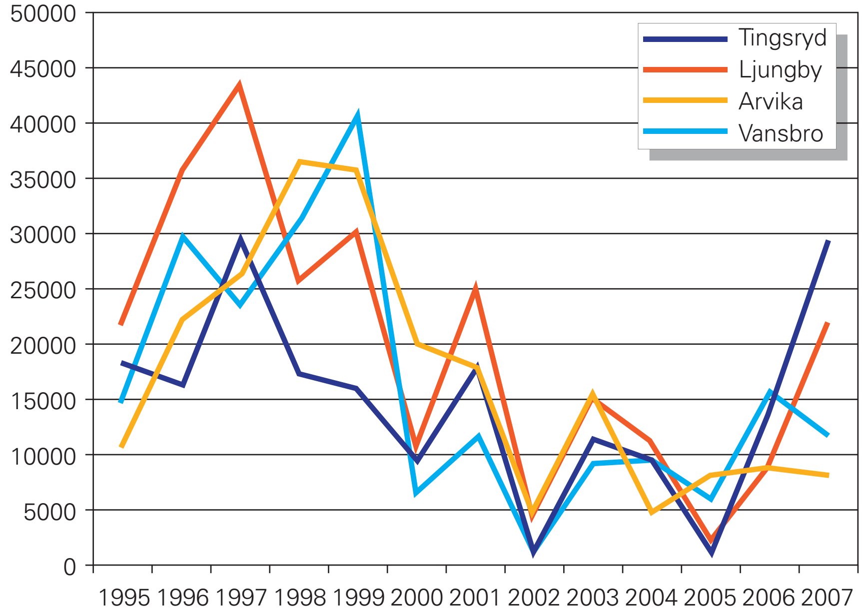

Figure 4: Pheromone trap catches 1995-2007: Numbers refers to total catch May-August in three traps (Nove).

Abbildung 4: Pheromonfallenfänge 1995 bis 2007: Gesamtfangzahlen von Mai bis August aus drei Fallen (Nove)

from the storm "Per" remained in the forest during summer. The volume of trees available for the spruce bark beetle is not known, but a substantial number acted as trap trees since they were cut and transported out of the forest during and after beetle flight in summer 2007 (Schroeder, unpublished).

The population level was relatively low in 2004 according to monitoring data (Figure 4). Only a minor part, around three to five percent of the huge number of wind-felled spruce trees were subsequently colonised by the spruce bark beetle in the first summer 2005 (Schroeder, unpublished; Wulff & Hannson 2007). Thus, there was an obvious excess of breeding material in the first season. No standing trees were killed in 2005. In 2006, approximately 50 % of the remaining wind-fallen trees were colonised by the spruce bark beetle (Schroeder, unpublished; Wulff & Hannson 2007). In both years a high production of spruce bark beetles was observed in the fallen spruce trees. The reproduction rate (♀/♀) in the first generation was about ten in both years (Schroeder, unpublished).

In the second half of summer 2006, unusual high temperatures and drought favoured spruce bark beetle attack, partly establishing a second generation. At the same time, drought increased the stress in trees, already having roots damaged by wind and thus making the trees more vulnerable to beetle colonisation. Numerous standing trees were attacked and killed in late summer 2006. The late attacks are probably made by parent beetles performing sister flights and a proportion of the new generation of beetles, generally reproducing after hibernation. The development of the second generation was completed in the mild autumn. It has been estimated that about 1.5 million m³ of standing spruce trees was

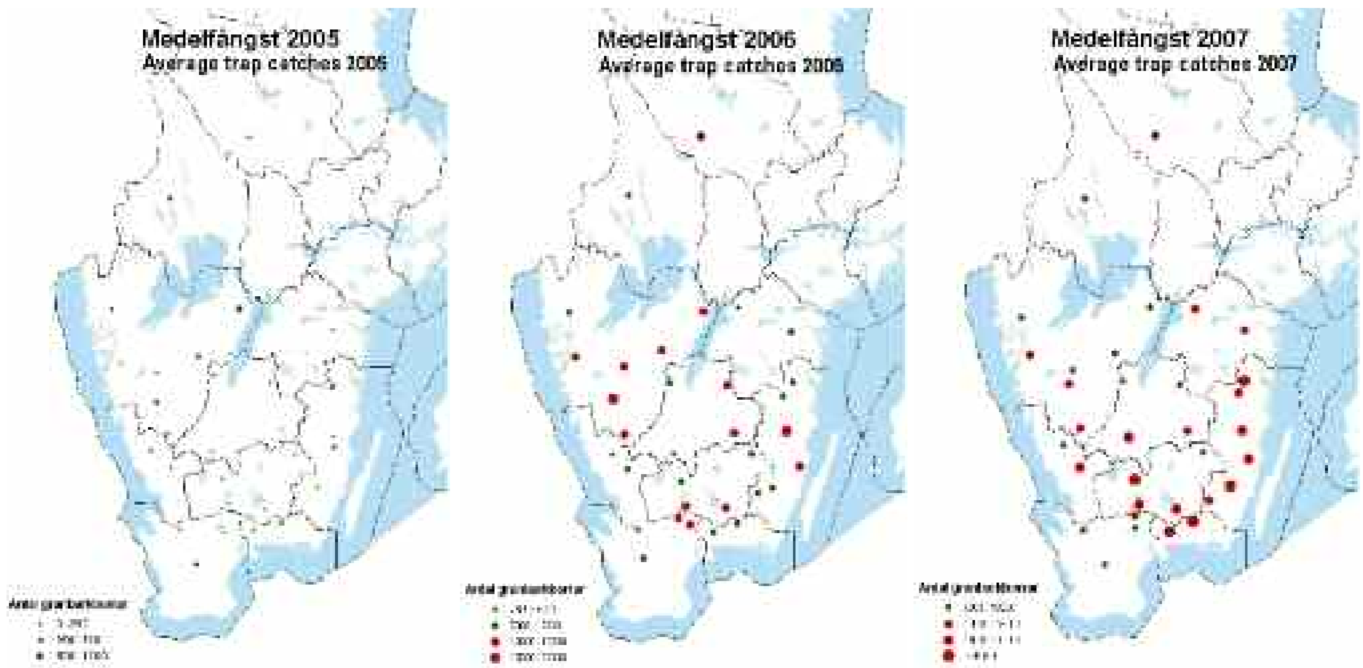

Figure 5: Pheromone trap catches May-August: Numbers refers to catches in three traps.

Abbildung 5: Pheromonfallenfänge von Mai bis August: Fangzahlen von drei Fallen

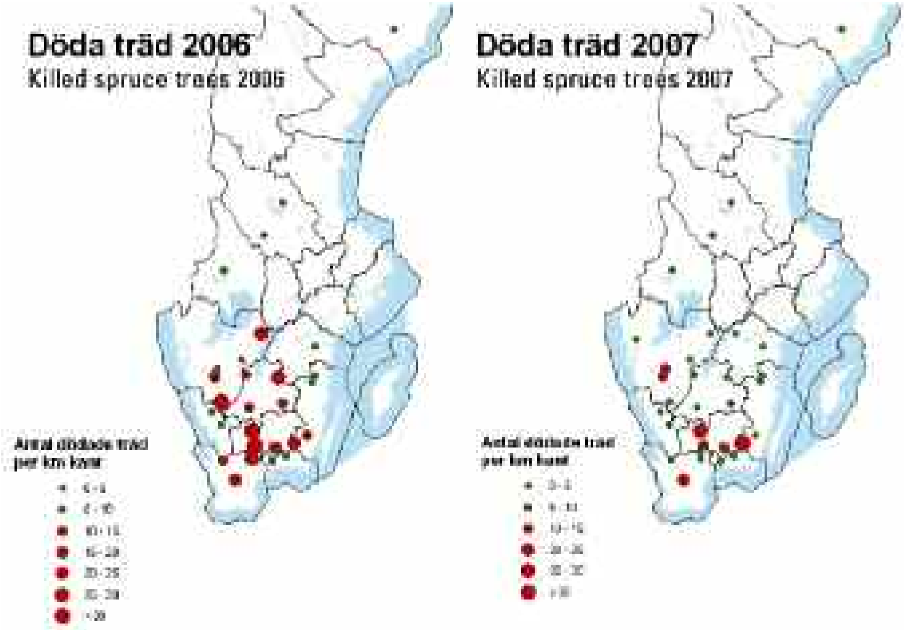

Figure 6: Number of spruce trees killed by the spruce bark beetle in stand edges (per km)
Abbildung 6: Anzahl von Borkenkäferbäumen an Bestandesrändern (pro km)

killed in 2006 (Forestry agency). This is probably an underestimation since many trees were still green and not visible until winter and thus not included in the estimation. The reproduction rate in the standing trees was about 5 (Schroeder, unpublished) which is quite high for standing trees. The low egg gallery density indicates a low resistance in the trees.

In 2007, the volume of killed spruce trees decreased and amounted to 0.5-0.8 million m³ (Swedish National Forest Inventory, Wulff and Hansson 2007, and estimation made by Forest agency). In the second part of the summer, rain suppressed flight activity and improved conditions for the trees. There were many signs of higher resistance to bark beetles attempting to colonise the trees, e.g. resin flow and unsuccessful colonisation of trees. A substantial "trap tree effect" after the storm "Per", by trees colonised by beetles otherwise killing standing trees, can not be excluded (Schroeder, unpublished).

In a specific monitoring of the spruce bark beetle using pheromone traps and surveying killed trees in stand edges has been performed in four regions in Sweden since 1995. The system involves three traps on five clear-cuts in each region (10000-40000 ha). In 2005, after the storm, the monitoring was expanded to 34 regions.

In 2007, a detailed registration of the flight activity using weekly pheromone trap catches was performed in six regions and the data was published on the homepage of the Forest Agency.

In Figures 5 and 6, trap catches and numbers of killed spruce trees at stand edges during 2005-2007 are presented. Trap catches indicate an increasing population in 2006 and further in 2007 compared to areas outside the storm area. The number of killed trees increased dramatically in 2006 compared to 2005 and than decreased from on average 14/km stand edges in 2006 to 7/km in 2007. The decrease of standing trees being killed may be explained by a combination of an increased resistance in standing trees during late summer as well as a "trap tree"-effect caused by remaining wind-felled trees being colonised.

Control

In 2005 salvage logging of wind-felled trees was intense and involved a lot of storage of timber sprinkled with water. Only small volumes were allowed to be stored in lakes. In 2006, besides salvage logging, sanitation logging of killed trees was done during the whole year. Sanitation logging was not recommended in the end of 2007, since it was discovered that most of the bark fell off and only a minor part of the beetles were removed from the forest using this method (Schroeder, unpublished). Instead, sanitation logging during summer has been strongly recommended. Plastic pheromone traps (25000) and insecticide treated trap logs (20000) were used in 2007, although the effect on the damage level is unclear. In the area of control, defined by the Forestry Agency a maximum of 3 m³ of fresh spruce may be left after the storm-fellings. Cut trees and logs must be transported out of the forest before the 1st of July.

According to an estimate by the Forest Agency, about 1 to 3 million m³ could be killed by the spruce bark beetle in 2008. Beetles produced in wind-felled trees during summer 2007 as well as beetles produced in standing trees or in the bark in trees still left in the forest are still remaining in the duff. New trees on the ground after storm fellings this winter may act as trap trees, but the time during summer when these trees should be cut and brought out of the forest is limited. Instead, forest owners are strongly recommended to do salvage logging as soon as possible.

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Ips cembrae Heer. (Col.: Curculionidae, Scolytinae) in Young Larch Stands – a New Problem in Poland

Wojciech Grodzki

Abstract

The mortality of young larch trees due to infestation by *Ips cembrae* was recorded in two regions of southern Poland: in the Sudeten mountains at altitudes between 700 and 1100 m a.s.l. and in the Silesia (~200 m a.s.l.), in the areas reforested 15-20 years ago. The main cause of the dramatic increase of the bark beetle population level was the abundance of breeding material due to wind/snow damage and thinning with no tree removal. Facing the gaps in knowledge on biology and control, additional research is needed to propose effective forest protection strategies.

Keywords: *Ips cembrae*, larch, young stands, reforestation

Kurzfassung

***Ips cembrae* Heer. (Col.: Curculionidae, Scolytinae) in jungen Lärchenbeständen – Ein neues Problem in Polen**

In zwei Regionen im südlichen Polen wurde das Absterben junger Lärchen wegen Borkenkäferbefalls durch *Ips cembrae* verzeichnet: In den Sudeten in 700-1100 m Seehöhe und in Schlesien (~200 m Seehöhe) und zwar in Gebieten, in denen vor 15 bis 20 Jahren aufgeforstet worden ist. Als Hauptursache für den Anstieg der Borkenkäfer-Population ist die Fülle an Brutmaterial, das nach Wind/Schneeschäden und bei Durchforstungen ohne Holzabfuhr angefallen war, anzusehen. Offene Fragen zur Biologie und Bekämpfung erfordern zusätzliche Forschungsarbeiten, um effektive Forstschutzstrategien anbieten zu können.

Schlüsselworte: *Ips cembrae*, Lärche, junge Bestände, Aufforstung

Ips cembrae Heer. is a bark beetle living on larches (*Larix* spp.) and occasionally on stone pine (*Pinus cembra* L.). Larch is quite widely distributed in Poland, both in lowlands and mountains, reaching in the Tatras altitudes up to 1900 m a.s.l. In the Sudeten it is present only due to planting (Boratyński 1986). *I. cembrae* is known as the species living under the bark of mature trees, especially wind-felled (Michalski & Mazur 1999); not abundant in Poland, however known from quite many localities within the country (Burakowski et al. 1992).

Larch is one of the pioneer tree species, usually introduced on deforested areas as a cover crop. This case happened in two large areas in southern Poland and appeared due to natural disasters, which had to be reforested. The first one resulted from the forest decline in the Western Sudeten, where after the outbreaks of *Zeiraphera griseana* Hb. (1977-83) and *Ips typographus* (L.) (1983-87) about 13000 ha of Norway spruce stands died and had to be felled (Capecki & Grodzki 1998). The second one appeared in Silesia as a consequence of large forest fires in 1992, which destroyed about 9000 ha of stands in the forest districts of Kędzierzyn, Rudy Raciborskie and Rudziniec (Szabla 1994). In both areas larch was used to a large extent for the establishment of new forest. The total area of young larch stands potentially threatened by *I. cembrae* in the Sudeten is about 22000 ha, while the Silesian outbreak focuses about 1000 ha.

According to the documentation from the State Forests' Forest Protection Unit in Wrocław, responsible for the Sudeten area, first information on the infestation and killing of young (8-12 years) larches was recorded during the drought period in 1993-1994 in Kaczawskie Mts., on relatively low altitudes. After the drought in 2002, the increasing occurrence of this insect on young larch trees (~11 years old) was recorded in 2003 in the Izerskie Mts. at altitudes between 700 and 900 m a.s.l. (clustered damage) and above 1100 m a.s.l. (individually infested trees dispersed in the stands).

The increased occurrence in Silesia began in 1998, after the infestation of larches felled by wind in 1997; repeated mass infestation of standing trees occurred in 2004, after the thinning made in young larch stands in 2003 (Hutka 2006). In both areas, local outbreaks

Figure 1: Larch mortality due to *Ips cembrae* infestations in the Sudeten, summer 2007

Abbildung 1: Durch den Befall von *Ips cembrae* abgestorbene Lärchen in den Sudeten (Sommer 2007) centers were still active in 2007 (Figure 1). Similar local problems occurred in the Czech Republic, including the areas not far from the attacked stands in Poland, mainly on warmer localities (Knížek & Holuša 2007).

There is a common trait concerning the increase in bark beetle occurrence in both areas: sudden enhancement of breeding conditions in quite large areas. In the Sudeten it resulted primarily from the wind/snow damage in the winter 2005/2006 and later thinning without removal of felled trees and in the Silesia – wind damage in 1997 and similar thinning in 2003. The populations, primarily developed on broken, fallen and/or cut trees, attacked standing trees in the surrounding parts of stands. The important factor stimulating the infestations was water deficiency starting in 2002 and lasting till 2007.

The biology is not well recognized in *I. cembrae*. Also, information from literature on some details is either missing, sometimes outdated or contradictory. It concerns mainly the question of voltinism (number of generations related to the altitude) and hibernation – sites, stages and survival. There is no experience on its occurrence and control on higher altitudes.

Available data were collected mainly in lowland stands, under conditions which were completely different from those in the mountains. This species was already considered as an important pest of larch in the Western Sudeten, however the known data do neither indicate the occurrence in higher mountain zone, nor the damage in the mountains at all (Konca et al. 1994). There is also a change in species biology – switching from lying to standing larches and from mature trees with thick bark to young trees with fine bark, where development is completed (Figure 2).

The research project on *I. cembrae* started in the autumn 2007 by the Forest Research Institute in Kraków, in cooperation with State Forest Protection Services in Opole and Wrocław. The main questions to be answered based on field observations include:

- missing data on the biology, mainly on the stages and sites of overwintering,
- attractiveness of trees felled in autumn as the breeding material for the generation developing in the next spring,
- number of generations per year and its dependency on the site characteristics (especially – resulting from the altitude and thermal conditions),
- usefulness of pheromones for monitoring and control,
- influence of mechanical/abiotic injuries as predisposing factor for infestation,
- definition of selected stand characteristics related to the vulnerability or resistance to insect attacks,
- possible control methods acceptable for mountain areas under water protection restrictions.

Figure 2: *Ips cembra*e – entrance holes on young larch trees
Abbildung 2: *Ips cembrae* – Einbohrlöcher an jungen Lärchen

Based on the outcome of this survey, recommendations for forest management (including sylviculture) will be developed, in order to avoid or reduce local damage caused in young larch stands by this bark beetle.

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Research on the Proper Usage of the Pheromone Trap Method for Monitoring and Mass Trapping of *Ips typographus* L. and *Pityogenes chalcographus* L. in the Federation of Bosnia and Herzegovina

MIRZA DAUTBASIC, TARIK TRESTIC, OSMAN MUJEZINOVIC and MUHAMED BAJRIC

Abstract

The purpose of this paper is to determine the number of installed synthetic pheromone baited traps for monitoring and mass trapping of *Ips typographus* and *Pityogenes chalcographus*. the types of traps and pheromone dispensers and the propriety of used method on the site (trap position, trap distance of the nearest healthy spruce tree, trap height, etc.) are examined. The number of controlled traps was 1116; the number of those completely correctly placed traps was 223, that is 20 percent.

Keywords: *Ips typographus, Pityogenes chalcographus,* aggregation pheromones, traps

Kurzfassung

Untersuchung über die richtige Anwendung der Pheromonfallen-Methode zur Überwachung und zur Bekämpfung von *Ips typographus* L. und *Pityogenes chalcographus* L. in der Föderation von Bosnien-Herzegowina

Ziel dieser Arbeit ist es, die Zahl der eingerichteten mit Pheromonen bestückten Fallen zur Kontrolle und zur Bekämpfung von *Ips typographus* und *Pityogenes chalcographus* zu bestimmen. Es werden der Fallentyp, die Art der Pheromonabgabe und richtige Anwendung der Methode bezüglich Aufstellungsort (Fallenposition, Fallenabstand zur nächsten gesunden Fichte, Fallenhöhe, etc.) geprüft. Die Zahl der kontrollierten Fallen betrug 1116. Davon waren 223 Fallen oder 20 % völlig korrekt platziert.

Schlüsselworte: *Ips typographus, Pityogenes chalcographus,* Aggregationspheromone, Fallen

Introduction

The monitoring and mass trapping of *Ips typographus* and *Pityogenes chalcographus*, using pheromone baited traps, was first used in Bosnian Forestry in 1986. In the spruce forests of the Federation of Bosnia-Herzegovina a huge number of different types of traps with various aggregation pheromones for bark beetles were installed. The aim of this study was to investigate the proper usage of this method in the forest sector of the Federation of Bosnia-Herzegovina following discovery of improperly installed traps in previous years.

Materials and Methods

The study was initiated in spring 2007 with a questionnaire being sent to six state forest enterprises in the Federation of Bosnia-Herzegovina in order to obtain information about the number and type of traps and pheromone dispensers used and the date of their placement. During the summer of 2007 field surveys were carried out. Investigations included: trap position (the distance between traps and nearest spruce trees in accordance with recommendations of traps and pheromone dispensers producers), proper placement of pheromone lures in the traps, height of traps on site, counting damages of the traps and lures, purity of the collecting trays, cleanliness of area around the traps, methods of quantification of caught, and monitoring intervals. The total number of controlled traps was 1116. Comparison of catches between proper and improper installed traps has not been made.

Figure 1: Totally destroyed trap in the field
Abbildung 1: Völlig zerstörte Falle

Results

In the Federation of Bosnia and Herzegovina forests 3877 pheromone baited traps were used during 2007. Two types of traps were used: Theysohn (1603 traps or 42.4 %) and Ecotrap II (2185 traps or 57.6 %).

Also the following pheromone dispensers were used: Pheroprax, Chalcoprax, IT Ecolure, PC Ecolure, PCIT Ecolure and Typopher. During this study the pheromone dispenser Typopher was used for the first time in Bosnian forests. This study revealed that seven traps (0.62 %)

Figure 2: Trap installed too close to the nearest spruce trees
Abbildung 2: Zu nahe an die nächsten Fichten aufgestellte Falle

were totally destroyed in the field (Figure 1), 75 (6.72 %) traps were damaged and 1034 (92.65 %) had no visible damages. Proper positioning of traps was done in 466 cases (41.76 %). It was found that 496 traps were located too close to the nearest healthy spruce trees (44.44 %) (Figure 2), while 147 (13.17 %) traps were placed too far from the nearest healthy spruce trees (Figure 3). Also this study determined that 898 traps (80.46 %) were installed at the correct height, 29 (2.6 %) were installed too high and 182 (16.31 %) too low (Figure 4). A number of traps (16 or 1.43 %) were found empty without dispensers. 705 (63.17 %) dispensers were placed properly in the traps. In the collecting trays (containers) 395 (35.39 %) dispensers and ampoules were found. Collecting trays and containers were clean in 921 (82.53 %) trap cases and 188 (16.2 %) were found abandoned. Surrounding areas of the traps were clean on 937 (83.96 %) sites but 172 (15.41 %) traps were surrounded by high grass, bushes, bracken, etc.

Conclusions

The results of this study show that only 223 (20 %) out of 1116 pheromone baited traps were installed properly in the Bosnian forests during 2007. The main reason for such a low percentage is considered to be the lack of control in the Forestry Protection Sector, including the lack of planning and forest health strategies for bark beetle suppression in the Federation of Bosnia-Herzegovina.

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Figure 3: Trap placed too far from the nearest healthy spruce trees
Abbildung 3: Zu weit von der nächsten gesunden Fichte aufgestellte Falle

Figure 4: Trap placed too low in the field
Abbildung 4: Zu niedrig installierte Falle

Spruce, Fir and Pine Bark Beetle Outbreak Development and Gypsy Moth Situation in Croatia in 2007

BORIS HRAŠOVEC, MILAN PERNEK and DINKA MATOŠEVIĆ

Abstract

The last decade has been dynamic in terms of forest pest outbreaks in Croatian forests. Both xylophages and defoliators demonstrated their pronounced impact on tree vigor and growth of the main productive tree species. Silver fir bark beetles (*Pityokteines* spp., *Cryphalus piceae*) slowed down and dropped to almost standard population levels in 2007 (compared with steep rise and absolute maximum of attacked timber in 2005). Spruce bark beetles (*Ips typographus*, *Pityogenes chalcographus*) nearly doubled the amount of timber attacked in 2006. Gypsy moth (*Lymantria dispar*) outbreak succumbed, shrinking down to less than 3000 hectares of attacked forest (versus 33000 in 2005 and 20000 in 2006). Plausible reasons and possible outcomes of these outbreaks are discussed briefly in this paper.

Keywords: Outbreak, bark beetles, gypsy moth, Croatia, 2007

Kurzfassung

Entwicklung der Fichten-, Tannen- und Kiefernborkenkäfer-Massenvermehrung und der Schwammspinner-Situation in Kroatien 2007

Die letzten zehn Jahre waren von starken Veränderungen in Bezug auf die Massenvermehrung von Forstschädlingen in den kroatischen Wäldern gekennzeichnet. Xylophage Insekten und Defoliatoren haben sich deutlich auf Baumvitalität und Wachstum der wichtigsten Baumarten ausgewirkt. Die Tannenborkenkäfer (*Pityokteines* spp., *Cryphalus piceae*) wurden reduziert und ihre Zahl sank 2007 fast auf die normale Populationsdichte ab (im Vergleich zu einer steilen Zunahme und zum absoluten Maximum des befallenen Holzes im Jahr 2005). Die Menge an Schadholz, verursacht durch Fichtenborkenkäfer (*Ips typographus*, *Pityogenes chalcographus*), hat sich 2006 fast verdoppelt. Die Massenvermehrung des Schwammspinners (*Lymantria dispar*) brach zusammen und hat sich auf weniger als 3000 ha Schadensfläche reduziert (gegenüber 2005 und 2006 mit 33000 ha bzw. 20000 ha). Plausible Gründe und mögliche Ergebnisse dieser Massenvermehrungen werden kurz in diesem Artikel behandelt.

Schlüsselworte: Massenvermehrung, Borkenkäfer, Schwammspinner, Kroatien, 2007

Scenario for an outbreak

Compared with the rest of Europe, in Croatia, somehow different circumstances led to the onset of population outbreaks of some of the best known forest pests. Climate in general is regarded as crucial since the whole region suffered from the extremely hot and dry year 2003 which "paved the way" for what started a year or two later. The most straightforward effect was a higher incidence of various xylophagous insects that need a stressed tree in order to successfully invade its cambial tissue (bark beetles, jewel beetles and sawyer beetles). Early incidences and signs appeared at the turn of the century. However, unlike some Central and Western European countries, Croatia was not affected by large scale storms. Therefore, extensive wind fells or snow fells and breakages were not part of the bark beetle outbreak scenario in Croatia. A neglect of forest hygiene and inadequate harvesting procedures combined with some specific high-risk activities (new highway and pipeline transects through forested territory) added to what soon started to grow out of the usual amount of attacked conifer timber. Foresters seemed to have forgotten the potential and rate of growth of the most harmful bark beetle species. The countermeasures were not conducted properly and in time and outbreaks have started to appear more frequently and on larger surfaces.

Silver fir, spruce and pine bark beetle situation in 2007

Bark beetles in general have acted as the most important biotic agents in the past decade (Figure 1), especially in beech and fir forests in the continental part of the country. Reaching the highest population levels, silver fir bark beetles, namely the three of the *Pityokteines* species (*P. spinidens*, *P. vorontzowi* and *P. curvidens*, listed here in their relative order of importance starting with the most important one) dropped down in their population densities in 2007. While it was an easy task to find symptoms of their presence and various developmental stages of these early swarming bark beetles in previous years, the spring and summer 2007 have clearly shown the signs of return to the levels recorded before the 2003-2006 period. One of the various reasons responsible for this is the fact that foresters started to handle local outbreaks more actively and harvested timber in a more timely manner reducing the amount of re-infesting brood material in the forest and along forest roads. The contributing role of aforementioned highway and pipeline transects almost vanished since most of them were finished by 2005. Ongoing research on bark beetle

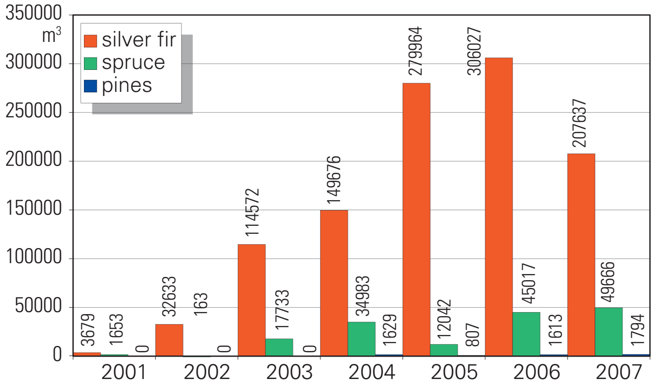

Figure 1: Amount of bark beetle attacked conifers in 2001-2007

Abbildung 1: Borkenkäfer-Schadholz: Nadelholz in Festmeter von 2001 bis 2007

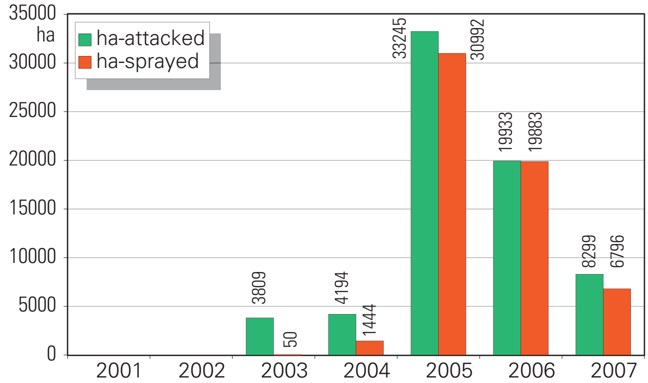

Figure 2: Gypsy moth: area attacked by and sprayed against Gypsy moth in 2001-2007

Abbildung 2: Schwammspinner: Befallsfläche und gespritzte Flächen von 2001 bis 2007

pathogens also indicate that natural enemies might have added to the reduction of *Pityokteines* populations in the forests affected by outbreaks (Pernek 2007). The last bark beetle from the "big four", *Cryphalus piceae*, is not considered as harmful as the three *Pityokteines* species. Its presence in branches of cut firs remained as common as it was during the whole period of fir dieback in the past five to six years. It is not quite clear what role and what importance this species has in the process of silver fir "battle" with secondary xylophages.

Spruce bark beetles, namely *Ips typographus* and *Pityogenes chalcographus*, on the contrary, dramatically heightened their population levels starting at the beginning of this century. After what seemed as slowing down in 2005, they erupted in 2006 and 2007, reaching the highest values of attacked spruce timber recorded in the past 30 years (more than 70 000 m^3). Compared to what has been happening in other European countries, these are small figures. Though, for Croatian circumstances the area affected is quite significant and it has been a long time since foresters have been confronted with bark beetle populations of these magnitudes. The scenario and explanation why this happened is quite similar to the general predisposing factors described in the beginning. We suspect that the reasons why the outbreaks did not slow down, but kept growing instead, are due to the structure of affected forests. Smaller spruce cultures in the east of the country have been hit earlier and could not spur larger outbreaks. Naturally growing mixed fir-beech-spruce forests in the west and south-west comprise larger areas, some of which are highly dominated by spruce. This, along with all the predisposing factors (high temperatures, summer and winter drought, inappropriate forestry measures) contributed to the uncontrolled growth of local bark beetle populations, leading to an extent almost impossible to slow down or to stop completely.

The last of the conifer related problems regarding bark beetles is represented by the *Tomicus* group, namely *Tomicus piniperda* causing problems in *Pinus sylvestris* and *Pinus nigra* stands and *Tomicus destruens* which was recorded for the first time as a harmful bark beetle causing measurable damages in the beginning of this century. Though the areas affected were small and timber loss negligible, the period 2000-2007 was the first one to record this bark beetle group causing a quantifiable timber loss.

Gypsy moth outbreak and its status in 2007

Among the defoliators, Gypsy moth (*Lymantria dispar*) dominated throughout the last period, erupting in 2005 with 33000 ha oak forests classified in high population density classes. The outbreak slowed down in 2006 and completely stopped in 2007 shrinking down to less than 3000 ha of affected oak forests. Confronting the outbreak, 31000 ha were sprayed in 2005 and close to 20000 the following year (Figure 2). In 2007 almost the whole affected area with heightened Gypsy moth population classes were sprayed and it is expected that this is the end of this outbreak episode. These outbreaks are also considered to be cyclical and partially climatically dependent which has been shown through several researches of local populations (Pernek & Pilaš 2005, Pernek et al. in press).

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Detecting Pine Sawfly Defoliation by Means of Remote Sensing and GIS

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Abstract

Insect outbreaks and climate change are two of the components comprising the greatest environmental challenges. Efficient remote sensing methods are needed for monitoring and predicting insect outbreaks. In this study an approach is outlined to map the distribution and intensity of defoliation by the Common pine sawfly with an EO-1 Hyperion imagery and digital aerial photography. Defoliation classification was compared using data from the Hyperion and digital aerial photographs without any seasonal differences.

Keywords: Defoliation, digital aerial photography, *Diprion pini*, outbreak, hyperspectral remote sensing

Kurzfassung

Erfassung der durch die Kiefernbuschhorn-blattwespe verursachten Entnadelung mittels Fernerkundung und GIS

Insektenkalamitäten und Klimaänderung sind zwei der größten Herausforderungen für die Umwelt. Effiziente Fernerkundungsmethoden sind für die Überwachung und Prognose von Kalamitäten erforderlich. In dieser Studie wird ein Ansatz skizziert, um Verbreitung und Intensität des Nadelverlustes durch die Gemeine Kiefernbuschhornblattwespe mittels EO-1 Hyperion-Aufnahmen und digitaler Luftfotographie katographisch darzustellen. Die Nadelverlust-Klassifikation wurde anhand von Daten vom Hyperion und von digitalen Luftbildern unter Ausschluss jahreszeitlicher Unterschiede verglichen.

Schlüsselworte: Entnadelung, digitale Luftfotographie, *Diprion pini*, Kalamität, hyperspektrale Fernerkundung

Introduction

The present warming trend in temperatures has already resulted in numerous effects on distribution and phenology of insect species. The increase of damages and invasions by forest insects has been seen to be related to the global changes in the climate (Peterson et al. 2004). Insect outbreaks and climate change are two of the components comprising the greatest environmental challenges.

Remote sensing and Geographical Information System (GIS) provide efficient tools for mapping actual insect distribution and damage (Ranson et al. 2003). The multi-date nature of satellite imagery permits monitoring dynamic features of landscape and thus provides a means to detect major land cover changes and quantify the rates of change. Rapid development in techniques has opened new ways in forest protection.

Figure 1: Defoliation by *Diprion pini* in Palokangas study area
Abbildung 1: Entnadelung durch *Diprion pini* im Untersuchungsgebiet Palokangas

During the latest outbreak of the Common pine sawfly (*Diprion pini* L.) in 1998-2001, approx. 500000 ha of pine forests were defoliated in mid Finland (Lyytikäinen-Saarenmaa & Tomppo 2002). The outbreak is still active in Ilomantsi district (E Finland), where approx. 13000 ha of forest is suffering from defoliation (Figure 1). In this paper, we outline an approach to map the distribution and intensity of defoliation with EO-1 Hyperion imagery and digital aerial photography.

Study area and field data

The Palokangas study area is located in the eastern parts of Ilomantsi, where mature Scots pine stands are mainly in a commercial use. Due to dry sandy soils the understorey is largely open. Some clear-cuts are located within the study area.

We measured 18 clusters of field plots in June 2007. The clusters represented different defoliation categories: low, moderate and heavy defoliation. Each of the clusters consisted of four circular plots, one of which being a permanent one. Plot location was georeferenced using a Trimble Pro XT GPS. Tree height, $D_{1.3}$, distance and angle from a plot centre were measured from trees within a 13 m radius. Tree-wise defoliation was estimated by naked eye in 10 %-classes.

Image data and classification

We employed one Hyperion image (30 m pixels), collected on October 11th, 2007 (Figure 2) and digital aerial photographs, acquired near the same date. Using data from the two sensors without any seasonal differences facilitates the comparison of the classification. The spectral resolution of the Hyperion image is high. Hyperion data has been earlier utilized e.g. in mapping of forest composition (Townsend & Foster 2002).

Digital aerial photography and other geographical information for monitoring forest health have already been used for assessing drought damages (Holopainen et al. 2006). The present interpretation is based on reference field plots and changes in image features caused by defoliation. The spectral features of Hyperion image and spectral and textural features of aerial photographs are used to classify the field plots with several methods such as maximum likelihood and nearest neighbours. The interpretation accuracy on plot and stand levels will be validated using the leave-one-out method.

Conclusion

Our study is the first attempt to analyze and classify insect defoliation with hyperspectral imagery. At the moment, we are working on the classification of the data. We also aim to compare accuracy, achieved with different spectral resolutions, i.e. comparing Hyperion and Landsat ETM data. Remote sensing will bring several advantages for monitoring forest damages and adapting forest management to climatic change.

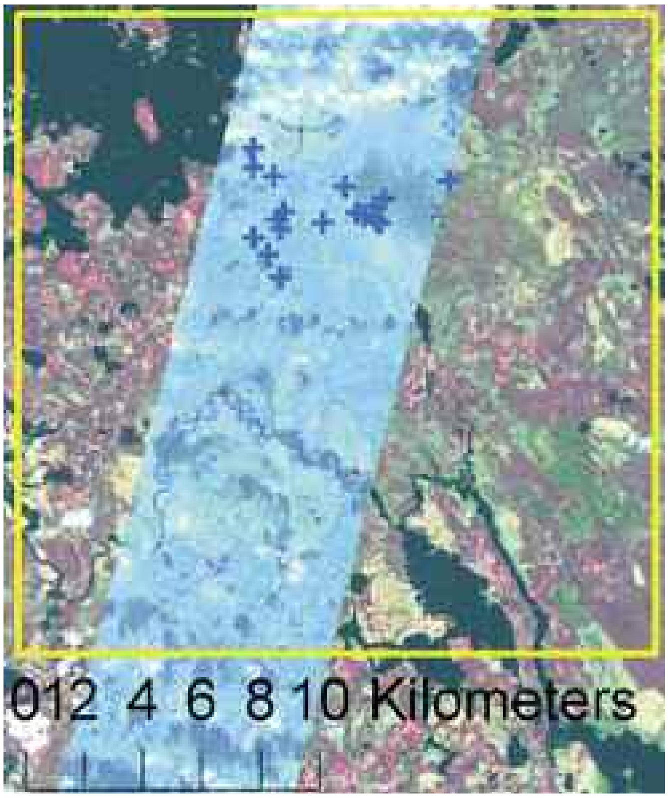

Figure 2: EO-1 Hyperion image on the Palokangas area, showing location of the clusters of field plots

Abbildung 2: Aufnahme von EO-1 Hyperion vom Gebiet Palokangas mit Lagedarstellung der Erhebungspunkte

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Involvement of *Chalara fraxinea* in Ash Dieback in Austria

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Abstract

In many parts of Europe including Austria, common ash, *Fraxinus excelsior* is presently affected by a serious dieback of shoots, twigs and branches. Between June 2007 and July 2008 the presumable ash dieback pathogen, *Chalara fraxinea* was found at 31 localities in Austria. Apart from *F. excelsior*, the fungus was isolated at one locality each from *Fraxinus angustifolia* subsp. *danubialis* and *Fraxinus excelsior* 'Pendula'. Fungal isolations have shown that *C. fraxinea* is associated with early symptoms of ash dieback. Moreover, the pathogenicity of this fungus to *F. excelsior* has been confirmed in inoculation experiments. We suppose that the presently occurring ash dieback in Europe is not a complex disease, but an infectious disease caused by *C. fraxinea*.

Keywords: New forest health problem, fungal disease, *Fraxinus excelsior, Fraxinus angustifolia* subsp. *danubialis, Fraxinus excelsior* 'Pendula'

Kurzfassung

Beteiligung von *Chalara fraxinea* am Zurücksterben der Esche in Österreich

Die Esche (*Fraxinus excelsior*) ist gegenwärtig in vielen Teilen Europas und auch in Österreich von einem schwerwiegenden Zurücksterben der Triebe, Zweige und Äste betroffen. Der vermutete Erreger des Zurücksterbens der Esche, *Chalara fraxinea,* wurde zwischen Juni 2007 und Juli 2008 auf 31 Fundorten in Österreich nachgewiesen. Abgesehen von *F. excelsior* wurde der Pilz an je einem Standort von *Fraxinus angustifolia* subsp. *danubialis* und von *Fraxinus excelsior* 'Pendula' isoliert. Die Pilz-Isolierungen haben gezeigt, dass *C. fraxinea* mit den Frühsymptomen des Zurücksterbens der Esche assoziiert ist. Ferner wurde die Pathogenität dieses Pilzes gegenüber *F. excelsior* in Inokulationsversuchen bestätigt. Wir nehmen an, dass es sich beim gegenwärtig in Europa auftretenden Zurücksterben der Esche nicht um eine Komplexkrankheit handelt, sondern um eine Infektionskrankheit, die von *C. fraxinea* hervorgerufen wird.

Schlüsselworte: Neuartiges Forstschutzproblem, Eschen-Triebsterben, *Fraxinus excelsior, Fraxinus angustifolia* subsp. *danubialis, Fraxinus excelsior* 'Pendula'

Since the early 1990s common ash, *Fraxinus excelsior* has been affected by a new forest health problem, known as ash dieback (Figure 1). Ash dieback was first observed in Poland and now it occurs in many European countries (Przybył 2002, Kowalski 2006, Kowalski & Holdenrieder 2008). In Austria, dieback of *F. excelsior* was first noticed between 2003 and 2005 and since 2006 it has been widespread and serious in many parts of the country (Cech & Hoyer-Tomiczek 2007, Cech, pers. comm., 2008, Kirisits et al. 2008).

Symptoms of ash dieback

Symptoms of this new syndrome include necrosis of leaf rachises and leaflet veins, shoot, twig and branch dieback (Figure 1) as well as necrotic lesions and cankers in the bark. Bark necrosis is often accompanied by brownish to greyish discolouration of the wood that frequently extends longitudinally beyond necrotic areas in the bark. Wilting of leaves can sometimes be seen on recently girdled shoots and twigs. Diseased trees react with prolific formation of epicormic shoots (Figure 1). The syndrome occurs on ash trees of all ages, both on natural regeneration and on planted trees. In Austria, mortality of mature trees has thus far only been observed in exceptional cases, but it is common amongst saplings and younger trees.

Suggested causes of ash dieback

Ash dieback was initially thought to be primarily caused by abiotic factors (early, winter and late frosts, drought and abrupt changes of periods with warm and cold weather conditions), with secondary, weakly virulent fungal pathogens and endophytes (e. g. *Diplodia mutila*, *Phomopsis* spp.) contributing to the syndrome (Przybył 2002, Pukacki & Przybył 2005, Cech & Hoyer-Tomiczek 2007). Accumulating evidence now suggests, however, that the recently described hyphomycete *Chalara fraxinea* (Figure 2) is involved in this unprecedented dieback of common ash in Europe (Kowalski 2006, Kowalski & Holdenrieder 2008).

Chalara fraxinea in Austria

Starting in June 2007, we aimed to examine the possible involvement of *C. fraxinea* in ash dieback in Austria (Halmschlager & Kirisits 2008). Following the methods of Kowalski (2006) the fungus was isolated from necrotic lesions on leaf rachises, leaflet veins, dead shoots, necrotic lesions in the bark and discoloured xylem of diseased ash trees. Between June 2007 and July 2008

Figure 1: Mature, solitary *Fraxinus excelsior* tree affected by ash dieback (Laussa, Upper Austria, July 2007).

Abbildung 1: Solitäresche mit starkem Trieb-, Zweig- und Aststerben (Laussa, Oberösterreich, Juli 2007)

C. fraxinea was found at 31 Austrian localities, including 16 localities in the Province of Lower Austria and five localities each in the Provinces of Vienna, Upper Austria and Styria (Kirisits et al. 2008). In one case the fungus was detected in a forest nursery. At 29 sites *C. fraxinea* was isolated from young *F. excelsior* trees, at one site from young narrow-leaved ash (*Fraxinus angustifolia* subsp. *danubialis*) trees and, in a park in Vienna, from weeping ash (*Fraxinus excelsior* 'Pendula') trees (Kirisits et al. 2008). The latter are the first and thus far only records of the fungus from a host other than *F. excelsior*.

Isolation of *C. fraxinea* proved to be difficult from trees showing late symptoms of disease, especially from tissues bearing fruiting bodies of other fungi. We suppose that on such plant material the slow growing *C. fraxinea* is in most cases already outcompeted by fast-growing endophytic or saprotrophic fungi. However, when isolations were made from shoots, twigs and stems showing early symptoms of disease (Figure 3) *C. fraxinea* was the most common fungus and in most cases the only one that was recovered.

Ash dieback: A new fungal disease

Kowalski & Holdenrieder (2008) reported the proof of pathogenicity of *C. fraxinea* to *F. excelsior*. This has been confirmed in own, presently ongoing inoculation experiments (Kirsits et al. 2008). Based on studies in Poland (Kowalski 2006, Kowalski & Holdenrieder 2008) and our preliminary results from Austria (Halmschlager & Kirisits 2008, Kirisits et al. 2008) we suppose that ash dieback is not a complex phenomenon, but an infectious disease, with *C. fraxinea* as primary causal agent.

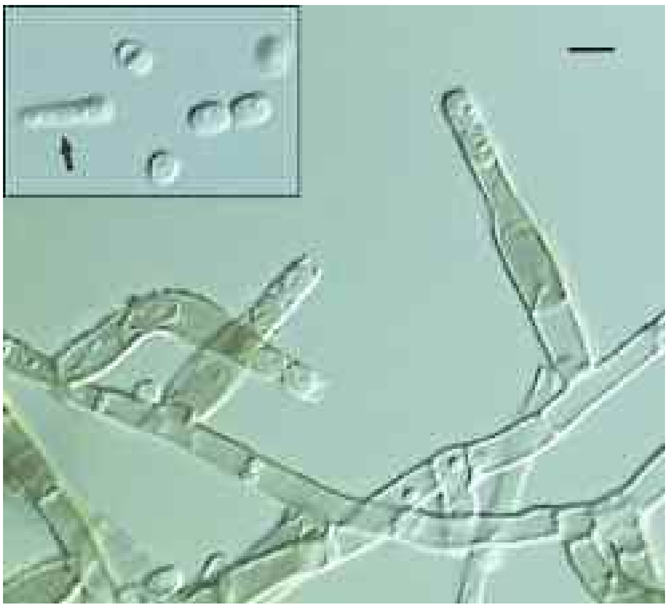

Figure 2: Phialophores and conidia (inset) of *Chalara fraxinea*. The arrow in the inset indicates a first-formed conidium. Bar = 4 µm.

Abbildung 2: *Chalara fraxinea*: Phialophoren und Konidien (Bildausschnitt). Der Pfeil im Bildausschnitt weist auf eine zuallererst gebildete Konidie hin. Balken = 4 µm.

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Figure 3: Small necrotic lesions on shoots of young *Fraxinus excelsior* trees prior to budburst (Schafberg, Vienna, mid-April 2008). *Chalara fraxinea* was the most common and in most cases the only fungus isolated from these shoots showing early symptoms of ash dieback.

Abbildung 3: Kleine Rindennekrosen an Trieben von jungen Eschen vor dem Austrieb (Schafberg, Wien, Mitte April 2008). *Chalara fraxinea* war der häufigste und meistens der einzige Pilz, der von diesen Trieben mit Frühsymptomen des Eschentriebsterbens isoliert wurde.

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The Forest Protection Situation in Austria 2006/2007

CHRISTIAN TOMICZEK

Abstract

Despite a cooler, wetter summer than in recent years, many insect species continued their gradation. The damage by spruce bark beetles reached a historical high with more than 2.5 million m³ of timber affected. Other Scolytidae, Buprestidae and Cerambycidae species registered also an increase. Damage by defoliators increased in 2005 and keeps gradually decreasing since 2006. Due to the moister conditions, regionally known diseases such as leaf and needle fungi in particular, were observed more often. Heavy snowfall during winter 2005/2006 led to outraging snow breakage on conifers of all age classes. In addition, severe frost damage on conifers could be observed. Locally damage by woodpecker occurred. Still unclear is the phenomenon of long stem cracks and bark damage on maple, which are not due to frost.

Keywords: Insect gradation, spruce bark beetle, defoliators, snow breakage, frost

Kurzfassung

Die Forstschutzsituation 2006 und 2007 in Österreich

Trotz eher kühler Witterung und überdurchschnittlicher Niederschläge konnte ein neuer Negativrekord durch Buchdrucker *(Ips typographus)* mit mehr als 2,5 Millionen m³ Schadholz verzeichnet werden. Ebenso kam es zu einer Zunahme bei weiteren Schadinsekten wie Scolytidae, Buprestidae und Cerambycidae. Seit 2006 nimmt die Bedeutung von fressenden Schmetterlingsraupen wieder ab. Die feuchtkühle Witterung hat auch zu einem Anstieg der Pilzkrankheiten geführt. Im Winter 2005/2006 wurden Schneebruchschäden in Nadelholzbeständen aller Altersklassen registriert. Zum Winterausgang wurden Winterfrost- und Frosttrocknisschäden an Douglasie und Lärche beobachtet. Zusätzlich ist es zu Spechtschäden sowie zu einem bisher ungeklärten Schadbild an Ahorn gekommen.

Schlüsselworte: Insektengradation, Fichtenborkenkäfer, Raupenfraß, Schneebruch, Frost

Spruce bark beetles

In 2005, a total of 2.56 million m³ of timber was cut due to bark beetle infestation. This is once again the highest amount of bark beetle damaged wood ever registered in Austria. Major damages were reported from Salzburg and Styria because of the consequences of the storm event in November 2002. The population of *Ips typographus* keeps increasing whereas other important bark beetle species such as *Pityogenes chalcographus* or *Ips cembrae* have decreased in comparison to 2004. For *Ips typographus* two generations were observed at lower altitudes, only one in higher regions.

Other Scolytidae, Buprestidae and Cerambycidae species showed also an increase especially in beech and oak.

Diseases

Dieback of young *Fraxinus excelsior* probably as a consequence of spring frost in 2005 is reported from Lower Austria, Upper Austria and Salzburg. Scleroderris-disease (*Gremmeniella abietina*) and Diplodia-dieback (*Sphaeropsis sapinea*), both related to hail wounds could be observed in the most western parts of Austria.

In Christmas tree plantations *Kabatina abietis* has become an increasing problem on some sites in eastern Austria. *Thysanophora penicillioides*, first detected as a needle cast fungus of Nordmanns fir in Austria in 2004, is probably widespread. Nevertheless, rarely changes from saprophytic to parasitic occurrence.

Defoliators

Leopard Moth (*Zeuzera pyrina*) mostly occurred on ash, maple and lime trees. Like every year in some parts of Austria moths of the genus *Yponomeuta* could be found in masses predominantly on *Prunus padus*, which often lead to defoliation and total wrapping of trees with web. The moth *Gelechia turpella* was observed in Vienna on an old poplar wrapping the stem completely. In 2005 winter moth (*Operophtera brumata)* and Gypsy moth *(Lymantria dispar)* increased their range. They have become less important since 2006. The same applies to oak processionary moth (*Thaumetopoea processionea*).

Snow breakage

Heavy snowfall during winter 2005/2006 led to severe snow breakage in many parts of Austria. Altogether, more than 2.2 million m³ of round wood had to be cut. It is expected, that this will further contribute to bark beetle damage during the next two years.

Frost

Damage by winter frost and frost drought was observed in young stands of Douglas fir and European larch in

Figure 1: Woodpecker damage on maple
Abbildung 1: Spechtschäden an Bergahorn

Figure 2: Bark damage of unknown cause on maple
Abbildung 2: Rindenschaden unbekannter Ursache an Bergahorn

the eastern, warmer parts of Austria. The weakened or dying parts of Douglas fir were often infested by secondary factors like small bark beetles (*Pityophthorus pityographus*) and Phomopsis bark disease (*Phomopsis pseudotsugae*).

Phenomenon on maple

A seldom phenomenon was observed in young maple stands. Trees were hit by woodpeckers, which seem to suck the maple sap (Figure 1). A completely different problem is bark damage (Figure 2) and long cracks (Figure 3) along the stem of younger maple. It seems that first the cracks occur and then the affected tree tries to close the wound. In some cases *Verticillium sp.* could be isolated out of the discoloured stem material, but not in all cases. Frost or too fast tree growth are definitely not the causal agents.

Figure 3: Stem crack and discolouration of unknown cause on maple
Abbildung 3: Stammriss und Holzverfärbung unbekannter Ursache an Bergahorn

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Forest Health Situation in Trentino, Italy

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Abstract

The Forest Trees Damages Monitoring (FTDM) of Trentino woodland has been carried out since 1990, in collaboration with the Forest and Fauna Service of the Autonomous Province of Trento, as a tool to support the naturalistic management of forests. In this monitoring program, data are obtained on pests, diseases and abiotic damages, allowing a better understanding of the health status of woods. In addition, it was assessed if past silvicultural choices were justified. Main damages recorded in the last few years are reported and discussed.

Keywords: Forest health, monitoring, pests, diseases

Kurzfassung

Forstschutzsituation in Trentino, Italien

Das Monitoring von Forstschäden in der Provinz Trentino wird in Zusammenarbeit mit dem Forst- und Faunadienst der autonomen Provinz Trentino seit 1990 durchgeführt, um die naturnahe Forstwirtschaft zu unterstützen. In diesem Monitoringprogramm werden Daten über Schädlinge, Pilzkrankheiten und abiotische Schäden erhoben, die eine genauere Kenntnis des Gesundheitszustandes der Wälder und eine Überprüfung von früher getroffenen forstlichen Maßnahmen zulassen. Es wird über die wichtigsten Schäden der letzten Jahre berichtet und deren Bedeutung diskutiert.

Schlüsselworte: Forstschutz, Monitoring, Schädlinge, Krankheiten

Forest Tree Damages Monitoring (FTDM) has been applied since 1990 by IASMA in collaboration with the Forest and Fauna Service of the Autonomous Province of Trento (Ambrosi & Salvadori 1998). The main aims of FTDM are the improvement of woodland phytosanitary protection, the increase of knowledge on potential agents for a better understanding of causal and predisposing factors and the assessment of the past silvicultural choices to suggest indications for the present management.

This extensive monitoring follows a standard methodology based on direct field survey by forest personnel, on periodical compilation of electronic forms about known damages and on report of unknown problems. The latter are identified by diagnostic work carried out by specialists both in the forest and laboratory. All the data have been geo-referred and related to the compartments of woodland management plans. Since 2005 the geo-referencing has been carried out directly by means of a WebGIS system (Valentinotti et al. 2004) to obtain a more accurate mapping.

In this context the situation observed in the last years is reported here. Also in Trentino the current forest health situation appears still strictly related to the effect of the 2003 summer, which resulted in both insects and fungi appearance and trees vitality. As shown in Table 1, pest outbreaks cover most of the reports of damage in the last three years.

Ips typographus foci started to increase during 2003 to reach in 2004 a peak never recorded before in absence of storms. More than 15000 m^3 had to be felled by force in 2004, while in 2005 the timber loss reached 25000 m^3 with more than 16700 affected trees. The amount of bark beetle infested timber showed a decreasing trend in 2006 (almost 13000 m^3) and in 2007 (less than 10000 m^3). *Tomicus minor, T. piniperda* and *Ips acuminatus* on *Pinus* spp. as like as *Xyleborus dispar* on broadleaves were also reported in the last three years, but with low losses of timber.

Lymantria dispar and *Operophthera brumata*, often associated with *Erannis defoliaria*, were the most common defoliators which produced remarkable damages in hornbeam and oak coppices between 2003 and 2005. *Coleophora laricella* has a constant presence in larch forests, occupying the third place in terms of records over the last three years. Moreover, *Pristiphora abietina* was frequently observed mainly on adult trees and in mature stands rather than on young trees as was recorded in the past.

A high gradation of *Thaumetopoea pityocampa* followed the anomalous 2006-07 winter after years of low population density. Particularly, the number of nests and the intensity of defoliation showed a huge increase in all pine stands. Even if the spread of the pine processionary moth did not reach the maximum range recorded in 1992, it must be highlighted that it recovered at higher altitudes and in valleys with more continental climate that were never affected before.

For the first time after the massive outbreak in 1989, *Elatobium* (= *Liosomaphis*) *abietinum* was observed again during 2007 spring in several hundreds of hectares all over the Province. The outbreaks of this aphid concerned spruce stands mainly located between 1000 and 1500 m a.s.l. The possible recurrence of the attacks in

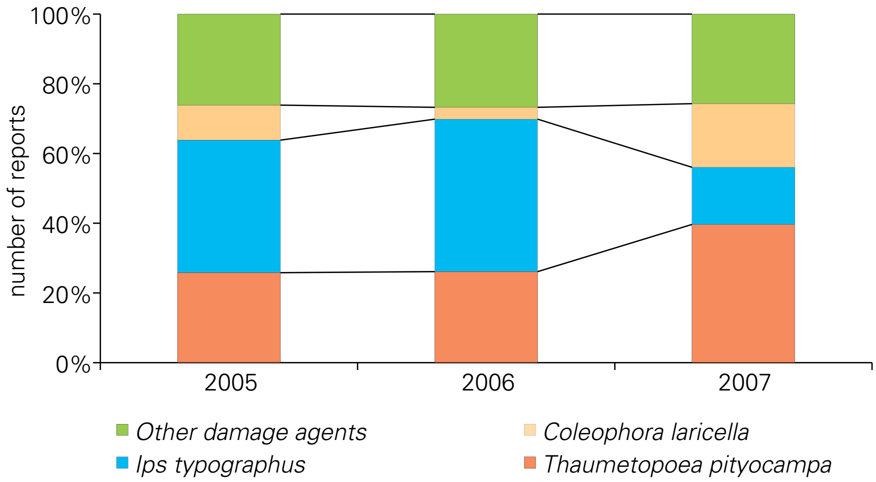

Figure 1: Main damage agents reported by Forest Tree Damages Monitoring in Trentino (2005-2007)

Abbildung 1: Hauptschadursachen, die sich aus dem Monitoring von Forstschäden der Provinz Trentino (2005-2007) ablesen lassen

Table 1: Number of damage notifications recorded in the last three years (1 record = 1 forest compartment)

Tabelle 1: Anzahl der Schadensmeldungen der letzten drei Jahre (1 Datensatz = 1 Forstabteilung)

Main kinds of damage agents	**2005**	**2006**	**2007**	**% 2005-07**
Broadleaves defoliators	15	9	7	1,6
Conifer defoliators	252	165	508	46,8
Sucking insects	0	1	50	2,6
Broadleaves bark and wood borers	1	2	1	0,2
Conifer bark and wood borers	266	228	145	32,3
Root diseases	1	0	0	0,1
Crown diseases	32	23	56	5,6
Mammals (game, rodents)	23	24	1	2,4
Abiotic factors	57	19	92	8,5
Total records	**647**	**471**	**860**	**100,0**

2008 may cause heavier problems in the affected stands that had already experienced a strong stress before due to the intense defoliation.

In June 2007, two foci of *Dryocosmus kuriphilus*, the Chinese chestnut wasp, were reported for the first time in Trentino. Both foci were caused by the plantation of affected Euro-Asiatic chestnut hybrids that were immediately removed and burned. The wasp adults were not yet emerged from galls at the moment of the finding. Hopefully, this feature will allow an easier control of this invasive pest.

In general fungal damages were not frequent in the last years. *Sphaeropsis sapinea* was still the main cause of tree loss, inducing the forced felling of more than 2500 m^3. The fungus is an endophyte and it is observed in all *Pinus nigra* stands of the province. Its pathogenic behaviour is strictly related to drought stress periods that frequently occurred in the last years, either in winter or in summer.

The Norway spruce rusts, *Chrysomyxa* spp., are the most widespread diseases, even if data showed wide oscillations due to weather behaviour during the infection period. *C. rhododendri* shows a constant presence at the timberline and it could affect spruce regeneration growth.

Dutch elm disease is still present but damages seemed to be reduced for the almost complete disappearance of host. Chestnut blight is endemic and ubiquitous in chestnut stands, but the clear prevalence of healing and healed cankers, due to hypovirulence, is stable and reassuring (Turchetti & Maresi 2005). *Botryosphaeria dothidea* was recognised as causal agent of target cankers on hornbeam. In 2001, this pathogen produced evident wilting of branches and small stems but since then only target cankers were observed in several stands. Till now, the pathogen seems not to be involved in extensive dieback phenomena on *Ostrya carpinifolia* as observed in other countries (Jurc et al. 2006).

Green alder decline is widespread in the province as on the rest of the Alps. Causes of this complex phenomenon have not yet been defined but this damage is going to modify vegetation cover and to influence stand evolution.

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Anoplophora chinensis (Forster) in Croatia

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Abstract

Asian citrus longhorn beetle (*Anoplophora chinensis*), commonly known as CLB, has been recorded for the first time in a horticulture nursery on the Adriatic coastline in Dalmatia, South Croatia. One dead adult along with clear signs of larval presence in the potted plants caught our attention and resulted in a positive identification of the species in September 2007. The list of plants with CLB larvae clearly pointed to the consignment originating from China which entered Croatia in a closed container in February 2007. The consignment consisted of several woody species among which *Lagerstroemia* sp. and *Acer palmatum* were found to be infested. Quarantine measures have been undertaken immediately after positive identification of a CLB larvae.

Keywords: CLB, *Anoplophora chinensis*, quarantine pest, Croatia, 2007

Kurzfassung

***Anoplophora chinensis* (Forster) in Kroatien**

Der Asiatische Citrusbockkäfer (*Anoplophora chinensis*), bekannt als CLB, wurde zum ersten Mal in einer Gärtnerei und Baumschule an der adriatischen Küste in Dalmatien, Südkroatien, gefunden. Ein toter Käfer zusammen mit deutlichen Merkmalen von Larven in den Topfpflanzen erregten Aufmerksamkeit und führten schlussendlich zur positiven Identifizierung der Art im September 2007. Die Liste der Pflanzen mit CLB-Larven wies auf eine Lieferung aus China hin, die im Februar 2007 in einem geschlossenen Container in Kroatien ankam. Die Sendung bestand aus mehreren Baumarten, von denen *Lagerstroemia* sp. und *Acer palmatum* befallen waren. Quarantäne-Maßnahmen wurden unmittelbar nach der positiven Identifizierung einer CLB-Larve ergriffen.

Schlüsselworte: CLB, *Anoplophora chinensis*, Quarantäne-Schädling, Kroatien, 2007

First detection and identification

During routine inspection (every forestry and horticultural nursery in Croatia is checked twice a year for pests and diseases) in mid-September 2007 one dead adult of *Anoplophora* candidate beetle was found in the distributional horticultural nursery in Turanj (Figure 1) near the town of Zadar, situated in mid Dalmatia. Taxonomic checkout of the well preserved beetle confirmed its taxonomic status. It was a Citrus longhorn beetle (CLB), to be exact, *Anoplophora chinensis* (Forster) species. It was clear from the beginning that the adult belonged to the *chinensis* subspecies, instead of already present *malasiaca* in Northern Italy, Lombardy. Parallel with the identification of the dead adult (Figure 2), immediate inspection of all of the plants in the nursery was carefully undertaken and clear signs of wood frass were located in *Lagerstroemia* and *Acer palmatum* potted plants. Dissection of infested plants revealed presence of Cerambycid larvae. By means of molecular analysis (BFW laboratory in Vienna) about a month and a half later the larva was identified as *Anoplophora chinensis* species.

Figure 1: Location of the first and single record of CLB in Croatia
Abbildung 1: Ort des ersten und einzigen Fundes von CLB in Kroatien

The origin and content of the infested consignment

The consignment that entered Croatia in February 2007 and found to be infested with CLB half a year later, consisted of 600 *Magnolia* plants, 400 *Lagerstroemia* plants and 9200 potted plants of *Acer palmatum*. They were transported into the country in a closed container and unloaded in the semi-closed glass house in the aforementioned distributional nursery. Of these, all *Lagerstroemia* plants showed symptoms of health problems (Figure 3), most of them being destroyed by CLB beetles (visible exit holes, no alive beetle/larvae in the stems).

Figure 2: First and single dead beetle of CLB detected in Croatia in September 2007

Abbildung 2: Erster und einziger, toter CLB-Käfer in Kroatien im September 2007

Figure 3: Frass (active) and exit holes symptoms on infested maples and dead Laegerstroemias at the nursery of the CLB's first record

Abbildung 3: Fraßaktivität und Ausbohrlöcher an befallenen Ahorn-Pflanzen und abgestorbene Lagerstroemia aus der Baumschule mit dem ersten CLB-Fund

Close to one third of the maple plants (2692 to be precise) developed some symptoms of health problems (Figure 3), less than one hundred of them showing clear signs of larval presence in lower stem (frass). Interestingly, no magnolias were found infested in spite of being shipped together with the highly infested batch. As in many known cases before, Chinese export plant health certificate clearly stated that the plants were free of pests and diseases.

Measures undertaken

According to the EPPO quarantine procedures, immediately a ban on plant relocation was issued, together with tracking and isolation of the small number (less than 50) of plants that were transported to two nurseries inside Croatia (Zagreb and Split). Both suspicious, health problem developing plants and clearly infested plants are to be burned, while all other plants in the nursery of first CLB record will be closely monitored and banned from allocating in the next two years. Legislative measures are being prepared and the "first record area" will receive special attention in the forthcoming period in terms of focused inspection for CLB attack symptoms, both in nursery as well as surrounding area.

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News about CLB and ALB in Italy

Matteo Maspero, Costanza Jucker, Mario Colombo, Franck Hérard,
Mariangela Ciampitti and Beniamino Cavagna

Abstract

Both longhorned beetles *Anoplophora chinensis* (Förster) (= *malasiaca*) and *Anoplophora glabripennis* (Motschulsky) (Coleoptera, Cerambycidae) have been accidentally introduced in Italy and are subject to eradication. Biological notes, life cycles, natural enemies and eradication attempts carried out by the Lombardy Plant Protection Service are reported.

Keywords: *Anoplophora chinensis, Anoplophora glabripennis,* Italy, Lombardy

Kurzfassung

Neues von CLB und ALB in Italien

Die beiden Bockkäfer *Anoplophora chinensis* (Förster) (= *malasiaca*) und *Anoplophora glabripennis* (Motschulsky) (Coleoptera, Cerambycidae) wurden versehentlich nach Italien eingeschleppt und werden nun mit geeigneten Maßnahmen vernichtet. Über Anmerkungen zur Biologie, Lebenszyklen, natürliche Feinde und Ausrottungsversuche des Pflanzenschutzdienstes der Lombardei wird berichtet.

Schlüsselworte: *Anoplophora chinensis, Anoplophora glabripennis,* Italien, Lombardei

Anoplophora chinensis

In 2000, *Anoplophora chinensis* was first detected in Lombardy in a nursery at Parabiago, 30 km west of Milan, during a survey made for a research project financed by Regione Lombardia on "New exotic pests in Lombardy". In 2000, the exact extent of the CLB infestation was not known yet but it was obviously larger than observed at the initial point of discovery at Parabiago. After several years of monitoring it appears that CLB is distributed within Milan (mainly in the western and north-western parts of the city) as well as in 30 municipalities northwest, west, and south of Milan. The distribution of the pest was determined during an intensive survey program covering the previously known infested sites and their surroundings within a radius of two kilometres around every infested tree. The monitoring was based on visual inspection of susceptible trees to find symptoms of CLB presence. Twelve workers, working in groups of two, were hired by the Plant Protection Service through Fondazione Minoprio to monitor the CLB-infested area and the associated buffer zones. From summer 2005 onwards, around 60 000 trees were checked in the public areas of more than 60 municipalities.

The main host plants of CLB in the Lombardy region belong to the genera *Acer* spp., *Platanus* spp., *Betula* spp., *Carpinus* spp., *Fagus* spp., *Corylus* spp., *Lagerstroemia* spp., *Malus* spp. and *Pyrus* spp. During the phase of eradication, which consisted of tree cutting and incineration, the periphery of the infested area was processed first.

The table shows the number of trees destroyed so far. The eradication process consisted of:

Year	No. of plants destroyed
2001	25
2002	35
2003	15
2004	168
2005	215
2006	2240
2007 (till June)	400

1. cutting down the aerial portions of the infested trees;
2. storing them in fenced areas within the municipality territory;
3. chipping the whole plant material and burning it to feed a "thermo-valorisation system";
4. grinding the infested stumps and main roots using a specific machine.

Because of some continuous evolution of the infestations, the monitoring and eradication programs are reviewed each year by the Phytosanitary Service and adapted to fit better to the new situation of the pest.

Biological notes

In the Lombardy Region, it appears that the peak of emergence of CLB occurred in late June. Exit holes were mainly located on the roots that are visible on the ground, and at the base of trunks within 20 cm above ground level.

The oviposition scars were mainly located around the collar of trees. In Northern Italy, it is suspected that most CLB individuals need two years to complete their development cycle, while a small proportion of them only needs one year.

Larvae overwinter at various stages, depending on the date of egg-laying. Larvae resume intense feeding during spring. The individuals, which overwintered as full-grown larvae, pupate during spring and emerge as adults in late May-early June. At the end of the pupal stage, the adults stay inside the pupal chamber for a week, during which their exoskeleton hardens. The adult chew a perfectly circular exit hole to emerge from its host tree.

The newly emerged adults move upward on the trunk and start feeding on suckers and the tender bark of young shoots, which may result in the death of these portions of the host plant. During and following their maturation feeding the adults mate repeatedly. Fertilized females move to the base of a tree, around the collar or on main roots, to search appropriate places to lay eggs. With its mandibles, the CLB female starts making a small incision, 3-4 mm long, through the bark, transversally to the axis of the trunk or of the root. When an appropriate place has been found, the female inserts its ovipositor in the prepared incision and injects an egg perpendicularly to the incision, within the bark (more or less at one half of its thickness). Under the pressure of the ovipositor inserted within the bark, the upper layer of bark cracks, so that the visible final symptom of an egg laid is a reverse T-shape crack of the bark. A single egg is deposited in each incision. At the intersection of the arms of the T-shape crack, one can see a tiny ovoid hole made during the insertion of the ovipositor. This hole is plugged with some brown secretion from the female's abdomen. The fluid hardens on contact with air, making a stopper that closes the entrance of the egg chamber. Incubation lasts 15-20 days depending on the temperature.

The first instar larva is around 6 mm in length. It chews the bark around the egg chamber and enlarges it. The second instar larva bores a gallery into the cambium layer and feeds on the latter. The third instar larva bores a gallery within the phloem and in the external layer of the xylem. Larvae develop through a variable number of instars which mainly depends on the duration of the overall larval development, in one or two years. CLB full-grown larvae are 50-60 mm in length.

Through the CLB exit holes and the larval galleries, diseases (mainly fungi) and other insects may produce secondary infections or infestations, thus increasing the stress to the host-plant.

In conjunction with the eradication programs, biological control studies were initiated in order to find, to identify, and to evaluate the parasitoids that could successfully control the pest. With the official agreements ("Letters of Authorization") from the French and the Italian Plant Protection Services, exposure of early stages of the host in sentinel plants placed on sites within or outside the area infested with CLB in Italy, was made. It showed that some natural enemies, pre-existing in the selected habitats, were attracted by the exotic pest and attacked it successfully. The egg parasitoid *Aprostocetus anoplophorae* Delvare (very likely originating from the Far East) was identified as a host specific species. The ectoparasitoids, *Spathius erythrocephalus* Wesmael (Hym.: Braconidae), *Eurytoma melanoneura* Walker, *Eurytoma morio* Boheman (Hym.: Eurytomidae), *Calosota agrili* Nikol'skaya, *Eupelmus aloysii* Russo (Hym.: Eupelmidae), *Cleonymus brevis* Boucek (Hym.: Pteromalidae, Cleonyminae), *Trigonoderus princeps* (Westwood) (Hym.: Pteromalidae, Pteromalinae), and *Sclerodermus* sp. (Hym.: Bethylidae) attacked early larvae of *A. chinensis* and developed successfully in this host. Life history traits and behaviour of some of the major parasitoids are currently studied at EBCL, USDA, ARS, Montpellier, France, to evaluate them as potential biological control agents.

Anoplophora glabripennis

The first detection of the Asian Longhorned Beetle, *Anoplophora glabripennis*, in Italy was made at Corbetta, in the yard of a private company, during a survey of the other exotic pest *A. chinensis*. One maple (*Acer pseudoplatanus* L.) and three birch trees (*Betula pendula* Roth) were found bearing many symptoms of ALB presence: oviposition pits, mandible marks, large quantities of frass at the base of the trees and in forks and hollow bark, exposed larval galleries along the stem, many exit holes and adult feeding on petioles and twigs. Wasps and flies attracted by the sap oozing from oviposition pits were also observed. These symptoms were observed from 1.5 m above ground up to the top of the crowns. In contrast, the *A. chinensis* symptoms are located at the base of the trunks and on superficial roots. During summer 2007, more than a dozen of beetles emerging from the infested host plants at Corbetta were captured, and their identity as *A. glabripennis* was confirmed.

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Asian Longhorn Beetle *Anoplophora glabripennis* (ALB) - Eradication Program in Braunau (Austria) in 2007

Hannes Krehan

Abstract

Infestation symptoms of the Asian Longhorn Beetle *Anoplophora glabripennis* were first detected in Braunau/Inn in November 2000 and officially confirmed after the first finding of an emerged beetle in July 2001. A report of the monitoring and eradication program 2000-2007 is given. As the amount of infested trees has not decreased within this period which means that the quarantine pest could not be eradicated, a more rigorous monitoring and control strategy is proposed.

Keywords: *Anoplophora glabripennis*, quarantine pest, monitoring, eradication, host trees

Kurzfassung

Asiatischer Laubholzbockkäfer (ALB) - Bekämpfungsmaßnahmen in Braunau (Österreich) 2007

Befallssymptome an lebenden Bäumen, die vom Asiatischen Laubholzbockkäfer *Anoplophora glabripennis* verursacht wurden, wurden das erste Mal im November 2000 entdeckt werden. Die offizielle Bestätigung erfolgte nach dem Fund eines ausgeschlüpften Käfers im Juli 2001. Der Bericht enthält die Ergebnisse des Monitorings und der Bekämpfungsmaßnahmen im Zeitraum 2000-2007. Da innerhalb dieser Periode die Anzahl der neu entdeckten Befallsbäume nicht abnahm, werden schärfere Überwachungs- und Bekämpfungsstrategien präsentiert.

Schlüsselworte: *Anoplophora glabripennis*, Quarantäneschädling, Überwachung, Bekämpfung, Wirtsbäume

The first symptoms of the Asian Longhorn Beetle (ALB) *Anoplophora glabripennis* (Motschulsky, 1853) were detected in November 2000. Bore holes, frass activity, wood shavings and cerambycid larvae were found on maples close to a home market centre. But the local aborists did not realize that this could be a quarantine organism. The presence of ALB was officially confirmed by the Austrian Plant Protection Organization after finding an adult beetle. Soon after this diagnosis the eradication program was started. All infested trees were cut; the complete organic material was chopped into small pieces and then burned. Also, a monitoring program of all potential host trees was initiated; first in the vicinity of infested trees and later on also in other parts of the town and in the surrounding forest (Figure 1). During the monitoring activities, carried out so far twice a year by inspectors of the forest authorities and of the Municipal Administration for Gardening and Tree Health of Braunau and experts of the Federal Research and Training Centre for Forests, Natural Hazards and Landscape (German abbr.: BFW), several hot spots of infestation have been found (Figure 2).

A detailed assessment of the detection dates of ALB-symptoms on trees or beetles found including the GIS-coordinates of the attacked trees was necessary for the documentation of the spreading of the pest in Braunau. Maps based on aerial photographs of all sites were produced to help the inspectors with their monitoring work and to find correlations between detected exit holes on trees and new egg deposition scars (Figure 3).

Some important results of the monitoring program

- Trees with exit holes hidden in a yard of a small factory: It is very difficult to find symptoms (even exit holes) of the beetle during leaf coverage in the vegetation period and when young trees are hidden inside private territories.
- Multiple attacks of at least two generations on one tree are possible, if there is enough space for feeding of the larvae and if the tree survives the first generation's attack.
- The first finding of ALB on trees in a small forest (Figure 3; Lower right corner) suggests, that all trees of that 15 years old poplar and willow stand were cut, irrespective if symptoms were detected or not.
- The enormously long presence and activity of adult living beetles were proved by a finding in October.
- In 2007, the inspectors reported for the first time an attack of *A. glabripennis* on *Fraxinus* and *Alnus*.
- Initially, beetles are often detected by private persons. Therefore, it is very important to publish leaflets and articles in newspapers regularly or disseminate information about the pest in local news media.
- Detection of symptoms on young, dense growing trees (e.g. along roads) is nearly impossible. It is recommended to cut them all as a preventive measure.
- Splitting of monitoring areas into different inspection groups might lead to problems, because of missing coordination and information exchange.

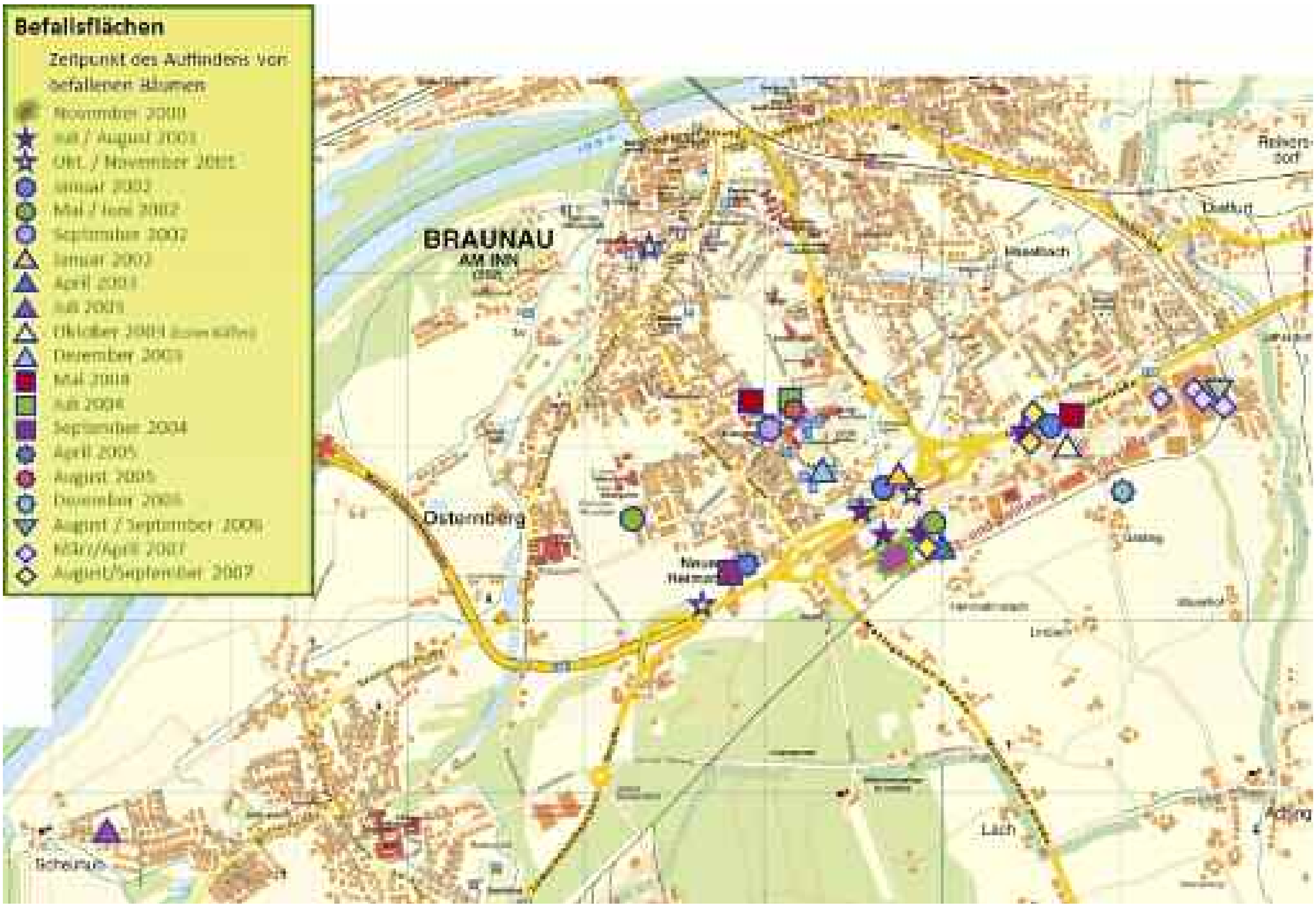

Figure 1: Trees with symptoms of ALB infestation and date of detection
Abbildung 1: Bäume mit ALB-Befallssymptomen und Zeitpunkt der Entdeckung

- Within a hot spot area the monitoring has to be repeated at least twice a year and throughout several years.

Intensive monitoring program – a new strategy

As shown in Table 1, the ALB eradication program in Braunau did not succeed as expected. The numbers of yearly new detected trees with ALB infestation could not be reduced. As a result of more intensive monitoring activities in 2007, more new ALB attacked trees than ever before were found (Hoyer-Tomiczek 2007).

Figure 2: Hot spots: areas where infested trees where found very often in the monitoring period
Abbildung 2: Hot spots: Flächen mit erhöhter Häufigkeit befallener Bäume innerhalb der Monitoringperiode

Therefore, a new, more intensive and expensive monitoring and eradication program for the following years is discussed:

- Within a circle of 100 m radius from a tree with exit holes: every potential host tree has to be cut (or used as an intensively surveyed trap tree).
- Within a circle of 300 m every potential host tree has to be investigated twice a year with tree climbers. All trees should be marked with a metal plate for easy identification.
- Financial assistance from governmental sources or from EU (solitary fond) will be requested.

Figure 3: Detail documentation of detected trees with ALB infestation during the monitoring period 09/2006-04/2007

Abbildung 3: Detaildokumentation entdeckter ALB-Bäume in der Monitoringperiode 09/2006-04/2007

In most cases, successful eradication of an introduced quarantine pest within a few years is very difficult to manage. The ALB, having a wide range of host trees and adapting very well to the ecological and climatological conditions of Central Europe, is one of the most problematical organism. Thus, the only way of preventing such introductions from foreign countries and continents is to regulate the potential sources of transmission: wood packaging material and plants for planting (Krehan 2007).

Figure 4: Heavily damaged Maple

Abbildung 4: Schwer geschädigter Ahorn

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Table 1: Results of the ALB Monitoring in Braunau

Tabelle 1: Ergebnisse des ALB-Monitorings in Braunau

Year	2001	2002	2003	2004	2005	2006	2007	Total
Infested trees with living stages of larvae or eggs (cut, chopped and burnt)	38	22	8	27	4	7	75	**181**
Infested trees with exit holes	?	0	3	4	0	4	3 1) + 5 2)	**19+ ?**
Adult beetles emerged outdoor in Braunau (number of detected exit holes)*	?	?	42	19	30	29	50	**170 + ?**
Number of escaped beetles in Braunau	?	?	17	15	30	28	40	**130 + ?**
Adult beetles collected in Braunau	89	0	25	4	0	1	10	**129**
Adult beetles emerged from infested logs from Braunau or out of artificial diet in quarantine lab	-	5	14	10	4	2	50	**85**

* year of detection of exit holes must not be identical with the year of beetle emergence
1) 1 Maple with 36 exit holes of the years 2005 + 2006
2) 1 Willow with 51 exit holes of the years 2007 (39) + 2006 + 2005

Stowaways in Wood Packaging Material – Current Situation in Bavaria

Ullrich Benker

Abstract

The IPPC standard ISPM No. 15 for wood packaging material should protect countries from the introduction of invasive non-native species. Heat treatment or fumigation seem to be appropriate methods for reaching this goal. Despite these measures some beetles of the Cerambycidae and Bostrichidae are still successful in using wood as a means of transport. The Asian Longhorned Beetle *Anoplophora glabripennis* was found in Bavaria already in 2004. In 2007 the Citrus Longhorned Beetle *Anoplophora chinensis* and a wasp beetle, *Xylotrechus chinensis*, emerged from wood packaging material. Among the auger beetles it was *Heterobostrychus hamatipennis*, *Heterobostrychus aequalis*, *Sinoxylon anale* and *Sinoxylon conigerum*, which were imported alive.

Keywords: Wood packaging material, Cerambycidae, Bostrichidae

Kurzfassung

Blinde Passagiere im Holzverpackungsmaterial – Aktuelle Situation in Bayern

Der IPPC-Standard ISPM Nr. 15 für Holzverpackungsmaterial soll Staaten vor der Einschleppung invasiver, gebietsfremder Arten schützen. Hitzebehandlung oder Begasung scheinen geeignete Maßnahmen zu sein, um dies umzusetzen. Trotzdem gelingt es immer wieder Käfern aus den Familien Cerambycidae und Bostrichidae, Holz als Transportmittel zu nutzen. Der Asiatische Laubholzbockkäfer *Anoplophora glabripennis* wurde bereits 2004 in Bayern gefunden. Der Citrusbockkäfer *Anoplophora chinensis* und der Wespenbockkäfer *Xylotrechus chinensis* schlüpften 2007 aus Verpackungsholz. Auch die Bohrkäfer *Heterobostrychus hamatipennis*, *Heterobostrychus aequalis*, *Sinoxylon anale* und *Sinoxylon conigerum* konnten lebend einreisen.

Schlüsselworte: Verpackungsholz, Cerambycidae, Bostrichidae

Regulations and observations

Since 2005, in international trading the IPPC (International Plant Protection Convention) standard ISPM (International Standard for Phytosanitary Measures) No. 15 has to be observed. In most cases this implies a heat treatment or fumigation, e.g. with methylbromid, for wood packaging material. Spraying of pesticides is alternatively but rarely done. Anyway, the entry of living stages and the hatching out of invasive non-native pests should be prevented at the place of destination. The worst case would be that an invasive species infests native plants, displaces native animals or causes other environmental damage. This is how the well-meant theory works!

The observations of the Plant Protection Service of Bavaria, of other German Federal States and of other European countries (Krehan 2007) are disillusioning. From time to time larvae, pupae or beetles in wooden material survive the treatment - whether actually done?! The cases recorded in the last years in Bavaria include longhorn beetles (family Cerambycidae) and auger beetles (family Bostrichidae).

Longhorn beetles (Cerambycidae)

The Asian Longhorned Beetle (ALB) *Anoplophora glabripennis* (Motschulsky, 1853) has been introduced in Bavaria since 2004 infesting living deciduous trees in Neukirchen/Inn. The infestation happened before the implementation of the ISPM No. 15. The season 2007 was quiet and nearly uneventful because only two maple trees had to be chaffed and burned.

In 2007 one report of the Citrus Longhorned Beetle (CLB) *Anoplophora chinensis* (Forster, 1771) was noticed in Weissenhorn near the town of Neu-Ulm. It was a female beetle and it emerged on the 5th of June from a wooden packaging box from China. The marking for methylbromid treatment was affixed to the box. A worker of the company caught the CLB, which was sitting near to the box on the ground and informed a forest officer. Later on, the single CLB was kept under conditions of

Figure 1: Citrus Longhorned Beetle *Anoplophora chinensis*, female

Abbildung 1: Citrusbockkäfer *Anoplophora chinensis*, Weibchen

Figure 2: Wasp beetle *Xylotrechus chinensis*
Abbildung 2: Wespenbock *Xylotrechus chinensis*

quarantine at the Institute for Plant Protection in Freising. It lived for five months exactly. The CLB is similar in its appearance to the ALB but has rows of polished tubercles on the first third of the elytra (Figure 1).

A few days after *A. chinensis*, on the 15th and the 19th June 2007, two specimen of a wasp beetle, *Xylotrechus chinensis* (Chevrolat, 1852), Tribus Clytini, emerged from the wooden material of Weissenhorn. Soon after emerging the female and the male beetle began to copulate. On the elytra and the pronotum are characteristic bands (Figure 2). The body is quite large (15-25 mm), the antennae are short and widely separated. The beetles were kept also in cages and lived for three to four weeks.

Auger beetles (Bostrichidae)

The Chinese auger beetle *Heterobostrychus hamatipennis* (Lesne, 1895) is recorded in Northern Asia, South Asia and South East Asia, from Madagascar and Mauritius. In 2007, two cases attracted attention in Bavaria. First, some beetles emerged from a bamboo basket. The basket was sold in a garden centre in Munich. Secondly, some individuals escaped from wood packaging material of a shipment originating in Vietnam. Male beetles have conspicuous horns on the lateral margins of the elytral declivities (Figure 3). Females are without horns.

The Lesser auger beetle or Oriental wood borer *Heterobostrychus aequalis* (Waterhouse, 1884) is recorded in South Asia and South East Asia, also in Madagascar and Cuba. One case of *H. aequalis* introduction was reported from Bavaria in 2007. These beetles were found in wooden material in a shipment from India. They were travelling together with the False powderpost beetle genus *Sinoxylon*. The wooden material had the marking for IPPC Standard ISPM No. 15 treatment. The conspicuous tubercles of male beetles obliquely point upwards (Figure 4). Females have no tubercles.

The genus *Sinoxylon* is spread with about 50 species all over Asia and Africa, also in Central and South America and the Mediterranean basin. The species are quite difficult to distinguish from each other. Up to now two species could be determined in Bavaria: *Sinoxylon anale* Lesne, 1897 and *Sinoxylon conigerum* Gerstaecker, 1855. The body size range of both species is 3.5-6.0 mm. They have distinctive elytral juxtasutural spines or teeth (Figure 5). The beetles were introduced from Vietnam, but mainly from India. Six cases of *Sinoxylon* introduction could be detected in 2007. The wooden material was reportedly treated according to ISPM No. 15. Very fine powder, ejecting from exit holes and accumulating below wooden pallets, is an indication of infestation with Bostrichids.

Wood packaging material in the international trading as well as furniture and wooden presents like statuettes and masks seem to be a good vehicle for non-native pests to reach Europe. Phytosanitary authorities, together with shipping companies and producers of wood packaging material, have the duty and the challenge to find ways of improving this situation.

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Figure 3: Chinese auger beetle *Heterobostrychus hamatipennis*, male
Abbildung 3: *Heterobostrychus hamatipennis*, Männchen

Figure 4: Oriental wood borer *Heterobostrychus aequalis*, male
Abbildung 4: *Heterobostrychus aequalis*, Männchen

Figure 5: False powderpost beetle, *Sinoxylon* sp.
Abbildung 5: *Sinoxylon* sp.

Alien Diseases of Woody Plants in the Czech Republic

Libor Jankovský, Dagmar Palovčíková and Miloň Dvořák

Abstract

In this contribution, we evaluate the present situation regarding alien diseases of woody plants in the Czech Republic. Of some 28 alien diseases, four have statutory quarantine organism status under European and Mediterranean Plant Protection Organisation (EPPO) and European legislation. These are Chestnut blight *Cryphonectria parasitica*, Dothistroma needle blight *Dothistroma septospora* (G. Doroguine) Morelet, Brown spot needle blight *Lecanosticta acicola* (Thümen) H. Sydow, and Fire blight *Erwinia amylovora.* The powdery mildews are a significant group of pathogens that are presently spreading. Newly recognised in recent years, for example, are *Erysiphe azaleae*, E. *elevata*, *E. flexuosa* and *E. carpinicola* (Hara) U. Braun & S. Takam, and others.

Keywords: Alien diseases, *Cryphonectria parasitica, Dothistroma septospora, Lecanosticta acicola,* powdery mildew

Kurzfassung

Fremdländische Krankheiten an Holzgewächsen in der Tschechischen Republik

In diesem Beitrag bewerten wir die derzeitige Situation hinsichtlich fremdländischer Krankheiten an Holzgewächsen in der Tschechischen Republik. Von 28 fremdländischen Krankheiten werden vier nach den Bestimmungen der Europäischen und Mediterranen Pflanzenschutz-Organisation (engl. Abkürzung: EPPO) und der Europäischen Union als Quarantäne-Organismus eingestuft. Dabei handelt es sich um den Edelkastanien-Rindenkrebs *Cryphonectria parasitica*, Dothistroma-Nadelbräune *Dothistroma septospora* (G. Doroguine) Morelet, Lecanosticta-Nadelbräune *Lecanosticta acicola* (Thümen) H. Sydow, und den Feuerbrand *Erwinia amylovora*. Mehltau-Pilze gehören zu einer Gruppe von Krankheitserregern, die sich derzeit ausbreiten. In den letzten Jahren konnten zum Beispiel *Erysiphe azaleae*, *E. elevata*, *E. flexuosa* and *E. carpinicola* (Hara) U. Braun & S. Takam neu beobachtet werden.

Schlüsselworte: Fremdländische Krankheiten, *Cryphonectria parasitica, Dothistroma septospora, Lecanosticta acicola*, Mehltau

Alien diseases of woody plants represent a serious phytosanitary risk to forest stands, solitary trees and plantations of ornamental woody species. Many such alien diseases found in the past can now be regarded as naturalised. Examples include Dutch elm disease *Ophiostoma ulmi* (Buism.) Nannf. and powdery mildew *Microsphaera alphitoides* Griff., as well as the more recently introduced Dothistroma needle blight *Dothistroma septospora* (G. Doroguine) Morelet and others.

A survey of alien diseases confirmed that around 28 species occur in the Czech Republic (CR), including four quarantine diseases. The quarantine diseases, with the exception of fire blight caused by *Erwinia amylovora*, have all been found in the last ten years. These are chestnut blight *Cryphonectria parasitica* (Murril) M.E. Barr, Dothistroma needle blight, and brown spot needle blight *Lecanosticta acicola* (Thümen) H. Sydow.

Dutch elm disease, which was first reported in the CR in Poděbrady and Prague in 1932, is by all its consequences a typical alien disease. A mass decline in elms in the 1960s and 70s is associated with *O. novo-ulmi* Brasier (Brasier 1991). It was confirmed in the CR by Dvořák et al. (2007), the predominant subspecies being *O. novo-ulmi ssp. novo-ulmi*. Also noted was *O. novo-ulmi ssp. americana*, together with hybrids, which has been recorded in Austria too (Konrad et al. 2002).

Douglas-fir needle blight *Rhabdocline pseudotsugae Syd.*, first detected in Western Bohemia in 1938, is now a naturalised type. In some areas, needle blight wholly limits the cultivation of susceptible varieties and those of Douglas origin, especially *Pseudotsuga menziesii var. caesia* and *var. glauca*.

Swiss needle cast *Phaeocryptopus gaeumannii* (Rohde) Petr. was recorded for the first time in Central and Southern Bohemia in 2002 (Pešková 2003), and in Southern Moravia and around Brno in 2003. At present, the ongoing spread of needle blight among Douglas-fir throughout the CR is causing concern.

Chestnut blight *Cryphonectria parasitica* (Murril) M. E. Barr. (Figure 1) was recorded in the former Czechoslovakia in 1976 at Prašice - Duchonka by Topľčany in Slovakia (Juhásová & Bernadovičová 2001). It was confirmed in the CR in 2002 (Jankovský et al. 2004b). At present, it is known from six localities. At each locality it has been detected on another vegetatively compatible group. Chestnut blight was also confirmed on red oak *Quercus rubra* (Haltofová et al. 2005). Although the situation is stabilised at present, following eradication at all localities, this disease still requires continuous quarantine control. At present, the CR has the status of a protected zone in accordance with EU directives.

Figure 1: *Cryphonectria parasitica* - typical symptoms: necroses and fruiting bodies, Těšany u Brna, March 2005
Abbildung 1: *Cryphonectria parasitica* - typische Symptome: Nekrosen und Fruchtkörper, Těšany bei Brünn, März 2005

Dothistroma needle blight *Dothistroma septospora* (G. Doroguine) Morelet (teleomorph *Mycosphaerella pini* E. Rostrup) was recorded in the CR for the first time in 1999. It was detected on Austrian Pine *Pinus nigra* ssp. *austriaca* originating from Hungary during control of imported plant material by the State Phytosanitary Administration. The first finding of *D. septospora* in the CR was in May 2000 on a plantation of Christmas trees *P. nigra* at Jedovnice near Brno (Jankovský et al. 2004a). To date, it has been detected on 20 species of pine (Figure 2), four species of spruce and on Douglas firs (Bednářová et al. 2007). It is very common across the CR.

Figure 2: *Dothistroma septospora* on *Pinus silvestris*, Southern Bohemia, March 2008
Abbildung 2: *Dothistroma septospora* an Weißkiefer, Südböhmen, März 2008

Figure 3: *Lecanosticta acicola* on *Pinus rotundata*, Soběslavská blata, Southern Bohemia, August 2008
Abbildung 3: *Lecanosticta acicola* an Moor-Spirke, Soběslavská blata, Südböhmen, August 2008

Brown spot needle blight *Lecanosticta acicola* (Thümen) H. Sydow, (teleomorph *Mycosphaerella dearnessii* M.E. Barr) was identified on a specimen of bog pine *P. rotundata* (Figure 3) from Southern Bohemia in July 2007 (Jankovský et al. 2008). This significant phytopathological problem is complicated by the specimen's origin in a national nature reserve. Current eradication procedures cannot be used in this locality. This is the only confirmed finding so far, and both the spread of the disease in this region and its potential for spreading to Scots pine *P. sylvestris* remain unclear.

Alder dieback *Phytophthora alni* C. Brasier & S.A. Kirk was confirmed in the CR by Černý et al. (2003). It mostly affects Southern Bohemia, though alder dieback is widespread throughout the CR. The origin of sudden oak death, *Phytophthora ramorum*, was not proven to be oaks in the CR, despite being recorded on *Viburnum bodnantense* by the State Phytosanitary Administration (Běhalová 2006).

The largest number of newly discovered alien pathogens comes from the powdery mildew group *Erysiphales*. Palovčíková et al. (2007) identified 27 species of powdery mildew on woody plants. Of these, a minimum of seven can be termed alien. Examples include *Erysiphe azaleae* (U. Braun) U. Braun & S. Takam. on *Rhododendron* spp., *E. elevata* Burrill. on *Catalpa* spp., *E. flexuosa* (Peck) U. Braun & S. Takam. on *Aesculus* spp., *E. carpinicola* (Hara) U. Braun & S. Takam. on *Carpinus betulus*, and others (Lebeda et al. 2007a, 2007b; Palovčíková et al. 2007).

Figure 4: Ash decline – necroses on bark caused by *Chalara fraxinea*, Beskydy Mts., July 2008
Abbildung 4: Eschentriebsterben: Rindennekrose verursacht durch *Chalara fraxinea*, Beskiden Juli 2008

The cause of ash dieback, *Chalara fraxinea* Kowalski (Kowalski 2006), was confirmed in October of 2007 in the arboretum at Krtiny near Brno (O. Holdenrieder, oral comm.). Ash dieback symptoms (Figure 4) were observed in the CR from the mid-1990s, and increasingly from 2004. The deteriorating health of ash is associated with unfavourable climatic extremes and debatably with sucking insects as one of the stress factors, or as vectors.

Melampsora hiratsukanum (Müller 2003) is an alien rust fungus of alder. In certain years, at some localities, it has reached epidemic levels.

During the 20th century, a succession of diseases was introduced into the CR. The main causes were social and economic changes, and changing natural conditions within the European countryside. A great acceleration in the spread of new disease species in the CR was brought about by the opening of borders and trade after 1990. To what degree the appearance of new pathogen species since the 1990s is due to societal change, concurrent climatic extremes, or more intensive research, however, remains unclear.

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Two New Insect Species in Austria: One Established, the Other One Not (Yet)

GOTTFRIED STEYRER and BERNHARD PERNY

Abstract

In August 2007 the longhorn beetle *Eburodacrys elegantula* (Gounelle, 1909) was introduced to Vienna with liana for terraristic equipment. The beetle probably came from Brazil. It is not likely to spread in Austria due to climate conditions in winter. Already in 1999, the American Dock leaf bug *Leptoglossus occidentalis* (Heidemann, 1910) was found first in Europe (Italy), and in 2005 also in Austria. In autumn, many bugs were detected near buildings. Extreme weather conditions of the Austrian winter could not stop the spread of this species.

Keywords: *Eburodacrys elegantula, Leptoglossus occidentalis*, introduction, invasion, import

Kurzfassung

Zwei neue Insektenarten in Österreich: die eine etabliert, die andere (noch) nicht

Im August 2007 wurde der Bockkäfer *Eburodacrys elegantula* (Gounelle, 1909) mit Lianen für den Terrarienbedarf in Wien eingeschleppt. Dieser Käfer stammt wahrscheinlich aus Brasilien und dürfte sich in Österreich aufgrund der derzeitigen Klimaverhältnisse im Winter nicht ausbreiten können. Bereits 1999 wurde die amerikanische Randwanze *Leptoglossus occidentalis* (Heidemann, 1910) erstmalig in Europa (Italien) gefunden, 2005 auch in Österreich. Zahlreiche Wanzen wurden im Herbst bei Gebäuden angetroffen. Die Winterextreme in Österreich haben die Ausbreitung dieser Art sichtlich nicht verhindert.

Schlüsselworte: *Eburodacrys elegantula, Leptoglossus occidentalis,* Einschleppung, Einwanderung, Import

Longhorn Beetle *Eburodacrys elegantula* larvae imported in liana

In August 2007 the Department of Forest Protection, BFW was notified by a reptile owner in Vienna, that she had heard a noise coming from the liana in the Terrarium of her Spiny Tail Lizard (Mountain Horned Dragon, Agamidae) and shortly after, a large insect had emerged, which she correctly identified as a Longhorn Beetle. The piece of liana (Figure 1) had been bought from an Austrian pet shop. Very often they originate in the tropics of South America and despite of the not inconsiderable quantity of imports, Plant Protection Laws do not prescribe import controls.

The piece of liana was handed over to the Forest Protection Department, where under quarantine laboratory conditions seven more of the same exotic Longhorn Beetles hatched over the following weeks. The identification of beetles from other continents, especially from South America, Africa, and Asia, can be difficult due to the many yet unknown species or incomplete identification literature. However, in this case with literature covering European and Asia Minor Longhorn Beetles it was possible at least to propose the following classification: they stem from the *Eburiini* beetles.

After further investigations on the internet, we conclude that the beetle could be classified in the genus

Figure 1: Probably South American liana as terraristic equipment with exit holes of beetles
Abbildung 1: Vermutlich südamerikanische Lianen für den Terrarienbedarf mit Käfer-Ausbohrlöchern

Figure 2: Long horned beetle *Eburodacrys elegantula*, male (a) and female (b), introduced to Vienna with liana

Abbildung 2: Männlicher (a) und weiblicher (b) Bockkäfer *Eburodacrys elegantula*, mit einer Liane nach Wien eingeschleppt

Eburodacrys, and it is most likely to be *Eburodacrys elegantula* Gounelle, 1909 (Figure 2). Although the hind markings of the wing cases (Figure 3) on the beetles are somewhat alternatively marked to the references, the entomology and specialist for Longhorn Beetles Steven Lingafelter (USDA, Smithsonian Institution, Washington, D.C.) could confirm this.

This Longhorn Beetle species occurs in Bolivia, Ecuador, and Brasil (Lingafelter, pers. comm.; Martins et al. 2006; Wappes et al. 2007) and is found in a large range of regions with varying climate and habitat. The complete host range of tree/plant species is unknown. However, due to the winter extremes in Austria it is unlikely that it could survive under current natural climate conditions.

Western Conifer Seed Bug *Leptoglossus occidentalis,* recent in Austria

Masses of large bugs were found in autumn 2007 near BFW Schönbrunn/Vienna. They were identified from the Leaf footed bug group as *Leptoglossus occidentalis* Heidemann, 1910. Although present in Europe since 1999, its presence in Middle Europe was recorded after having been found in Vienna, Carinthia, and Tyrol in autumn 2005 (Rabitsch und Heiss 2005), followed by Salzburg in 2006 (Nowotny 2007).

The 16 – 20 mm long bug is brownish in colour, whereby the mid section has a fine diagonal whitish marking (Figure 4). The upper-side of the abdomen ranges from yellow to yellow-orange, which is normally only visible during flight. A good identification method is the leaf shaped thickening of the back legs (Figure 5). Also, the teeth on the hind leg are clearly visible. Unlike most of the related family the released stink is more of apple scent in nature, and is not unpleasant.

The species was first described in California 1910, and, as previously mentioned, was found in Europe 1999 in Northern Italy. By 2001, it had populated a larger part

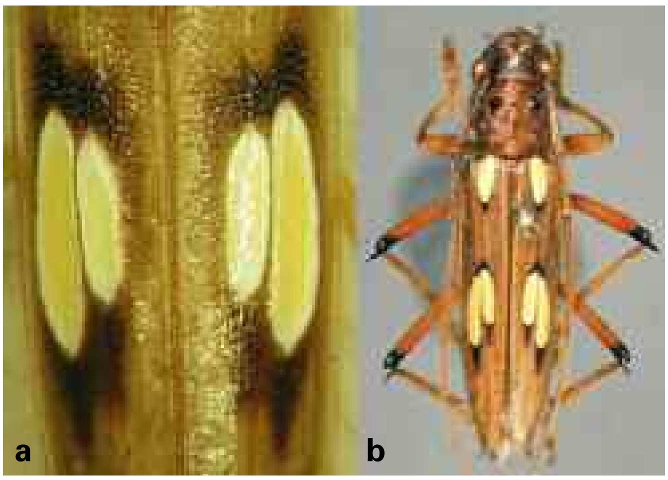

Figure 3: *Eburodacrys elegantula*: Hind patches of the elytra from the beetle hatched in Vienna (a) and from a reference beetle (b) by comparision

Abbildung 3: *Eburodacrys elegantula*: Hintere Flecken auf den Flügeldecken der in Wien geschlüpften Käfer (a) und jene eines Referenzkäfers (b) im Vergleich

(Quelle/source: http://plant.cdfa.ca.gov/byciddb/details.asp?id=1654)

Figure 4: Dock leafbug *Leptoglossus occidentalis*
Abbildung 4: Randwanze *Leptoglossus occidentalis*

Figure 5: Typical for *Leptoglossus occidentalis*: Hind tibiae with leaf-like expansions and hind femora with spines
Abbildung 5: Typisch für *Leptoglossus occidentalis*: Kräftige Hinterbeine mit blattartiger Verdickung der hinteren Schiene und Zähnen auf dem Schenkel

of Lombardei and Veneto (Bernardinelli & Zandigiacomo 2001). Before being detected in Austria 2005, it was present in Switzerland 2002, Spain 2003, Croatia and Hungary 2004. In 2006, it was found in Germany, France and in the Czech Republic. With its ability to fly, its spread and subsequent population of a region is almost inevitable. Its survival within our climatic conditions is enhanced, due to its overwintering strategy around the protected environments of buildings. Spread in varying larval development stages over long distances occurs through passive transportation of plant material.

The adult *Leptoglossus occidentalis* insect overwinters and draws nutrition from flowers and seeds in spring. The females lay their eggs on conifer needles, with main host plants being Pine species and Douglas fir. The young larvae feed primarily from the developing cones, and occasionally needles. After the 5th larva stage they become adults, which can be expected from August onwards. In Europe, they have also been found on *Picea, Abies, Cedrus* and *Juniperus*.

In the United States it is considered a pest,that can affect the potential seed production from a stand, but otherwise there is no visual damage. It is not yet possible to evaluate the potential damage to Austrian forestry (e.g. at Douglas fir). A potential epidemic level is not expected. It is more likely that the bugs become an annoying factor within habituated buildings during their autumn search for an overwinter resting place.

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3. Mirza Dautbasic, Tarik Trestic, Osman Mujezinovic and Muhamed Bajric: Research on the Proper Usage of the Pheromone Trap Method for Monitoring and Mass Trapping of *Ips typographus* L. and *Pityogenes chalcographus* L. in the Federation of Bosnia and Herzegovina
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5. Boris Hrašovec, Milan Pernek and Dinka Matošević: Spruce, Fir and Pine Bark Beetle Outbreak Development and Gypsy Moth Situation in Croatia in 2007
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7. Thomas Kirisits, Michaela Matlakova, Susanne Mottinger-Kroupa and Erhard Halmschlager: Involvement of *Chalara fraxinea* in Ash Dieback in Austria
8. Christian Tomiczek: Forest Protection Situation in Austria 2006/2007
9. Cristina Salvadori and Giorgio Maresi: Forest Health Situation in Trentino, Italy
10. Ralf Petercord: Actual Situation on Forest Protection in Baden-Württemberg
11. Andrija Vukadin and Boris Hrašovec: *Anoplophora chinensis* (Forster) in Croatia
12. Matteo Maspero, Costanza Jucker, Mario Colombo, Franck Hérard, Mariangela Ciampitti and Beniamino Cavagna: News about CLB and ALB in Italy
13. Hannes Krehan: Asian Longhorn Beetle *Anoplophora glabripennis* (ALB) – Eradication Program in Braunau (Austria) in 2007
14. Ullrich Benker: Stowaways in Wood Packaging Material – Current Situation in Bavaria
15. Libor Jankovsky, Dagmar Palovčíková and Miloň Dvořák: Alien Diseases of Woody Plants in the Czech Republic
16. Leopold Poljakovic-Pajnik: New Invasive Species of Aphids (Aphididae, Homoptera) in Serbia
17. Gottfried Steyrer and Bernhard Perny: Two New Insect Species in Austria: One Established, the Other One Not (Yet)
18. György Csóka: Locust Gall Midge: A New Invader in Europe

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