

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

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## 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 Kiefernborckenkäfer-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 Tannenborckenkäfer (*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 Fichtenborckenkäfer (*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, Borckenkäfer, 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. Cli-

mate 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

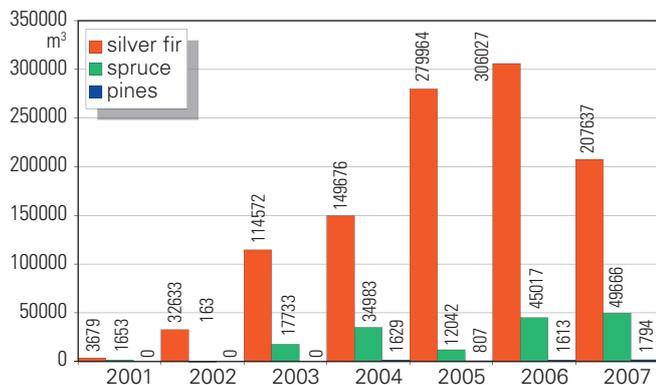


Figure 1: Amount of bark beetle attacked conifers in 2001-2007

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

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<sup>3</sup>). 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

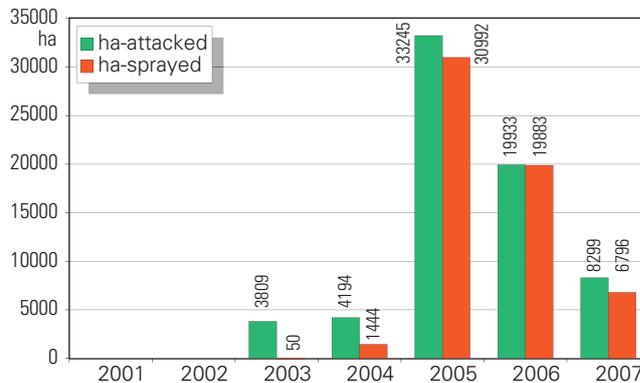


Figure 2: Gypsy moth: area attacked by and sprayed against Gypsy moth in 2001-2007

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

*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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