

Bark Beetle Populations in Croatia in 2008-2009 – Monitoring Data and Research Observations

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Abstract

An eruption of conifer bark beetle populations in Croatia that started after the drought year 2003 seems to be slowing down in 2008 and especially in 2009. According to the monitoring data and amount of timber that is being cut through salvage cuttings, spruce bark beetles are showing obvious three-year decline trend. This is even more pronounced with the silver fir bark beetles. It is hypothesized that this is a result of beneficial environmental conditions, buildup of natural enemy complex, reduction of host availability and intensive forestry activities. A newly recognized tree killing pest, *Tomicus destruens*, received special attention and through a detailed phenological screening it manifested a one year cycle in mid-Adriatic climatic conditions.

Keywords | bark beetles, outbreaks, *Tomicus destruens*, Croatia

Kurzfassung

Borkenkäfer-Populationen in Kroatien in den Jahren 2008-2009 - Überwachung und Forschung

Der dramatische Anstieg von Borkenkäfer-Populationen in Kroatien nach der Dürre im Jahr 2003 verlangsamte sich 2008 und insbesondere 2009. Anhand der Monitoringdaten und der Menge eingeschlagenen Käferholzes der letzten drei Jahre ist ein deutlich fallender Trend bei Fichtenborkenkäfern nachzuweisen. Diese Abnahme ist bei den Weißtannen-Borkenkäfern noch ausgeprägter. Wir vermuten, dass dies das Ergebnis von günstigen Umweltbedingungen, des Aufbaus des natürlichen Gegenspieler-Komplexes, der Reduzierung des Nahrungsangebotes und von intensiver Forstwirtschaft ist. Besonders beachtet wurde ein neuer gefährlicher Schädling, *Tomicus destruens*. Durch ausführliche phänologische Untersuchungen wurde ein einjähriger Entwicklungszyklus unter mitteladriatischen Klimabedingungen für diese Käfer festgestellt.

Schlüsselwörter | Borkenkäfer, Massenvermehrung, *Tomicus destruens*, Kroatien

Latest development of bark beetle populations in Croatian forests confirmed down slope trends in all of the major conifer tree species: Norway spruce, silver fir and pines. *Pityokteines* group of the silver fir bark beetles peaked in 2006 and dropped to population densities that are still above the average in 2009. Similar tendencies have occurred with the major spruce bark beetles, namely *Ips typographus* and *Pityogenes*

chalcographus. This is evident in both, the amount of beetle killed trees (Figure 1) and the analysis of pheromone trap catches in the 2001-2009 period. Trap catches of the two major spruce bark beetles and the silver fir beetle *Pityokteines curvidens* (Pernek et al. 2006), declined in the past four years. At the same time collateral catches of predatory beetles (like *Thanasimus formicarius* and *Nemosoma elongatum*) have been rising steadily since 2006.

Compared with other European countries, Croatia has not suffered any of the dramatic climatic catastrophes that would initiate outbreaks through vast amount of fallen and windbroken trees. However, one negative climatic factor was definitively present as was the case within the rest of Europe – drought. It is considered today as being one of the crucial inciting factors in the last outbreak episode in Croatian forests. There were some other contributing factors such as sloppy post-cutting practice and coincidence of exceptional clearcuts in some parts due to the highway constructions. Development of the outbreak, namely its slow-down, is considered to be the result of less harmful climatic conditions and intensified forestry activity that returned to the good and for some time neglected forest protection practice. Also, the increase of predators and parasitoids, together with heightened percentage of diseased beetles, probably added to the slowing of the population outbreaks. Clearly, the whole process that evolved in Croatian conditions is not straightforward comparable with the rest of the European countries, not even with the closest neighbors like Slovenia and Bosnia and Herzegovina. Dynamics of outbreaks, especially the amount of forest area affected and timber volume attacked depends strongly on stand characteristics, species composition and structure being highly important. Close to natural composition and structure of mixed Croatian forests certainly contributed to less dramatic negative effects of recent bark beetle outbreaks.

One of the effects of heightened bark beetle populations in general focused scientific and operational interest on some less known and economically important bark beetles. Isolated but pronounced attacks of *Tomicus destruens* in Aleppo pine cultures on the Adriatic coast incited research on some aspects of its biology.

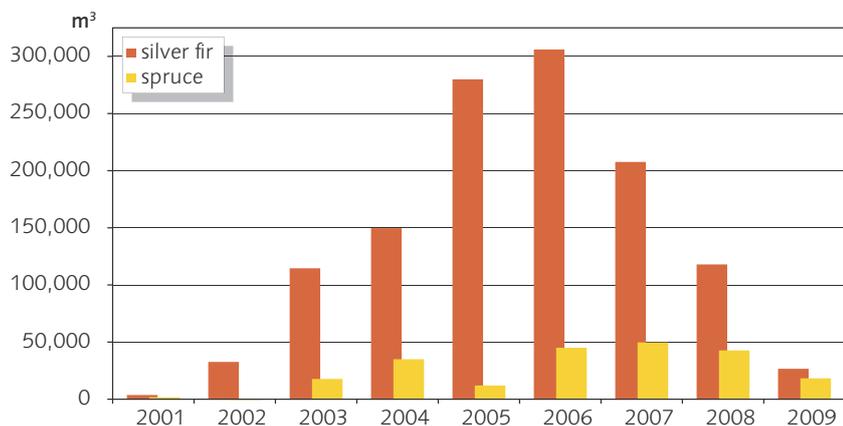


Figure 1: Amount of bark beetle attacked timber in 2001-2009.

Abbildung 1: Menge des Borkenkäfer-Schadholzes von 2001 bis 2009.

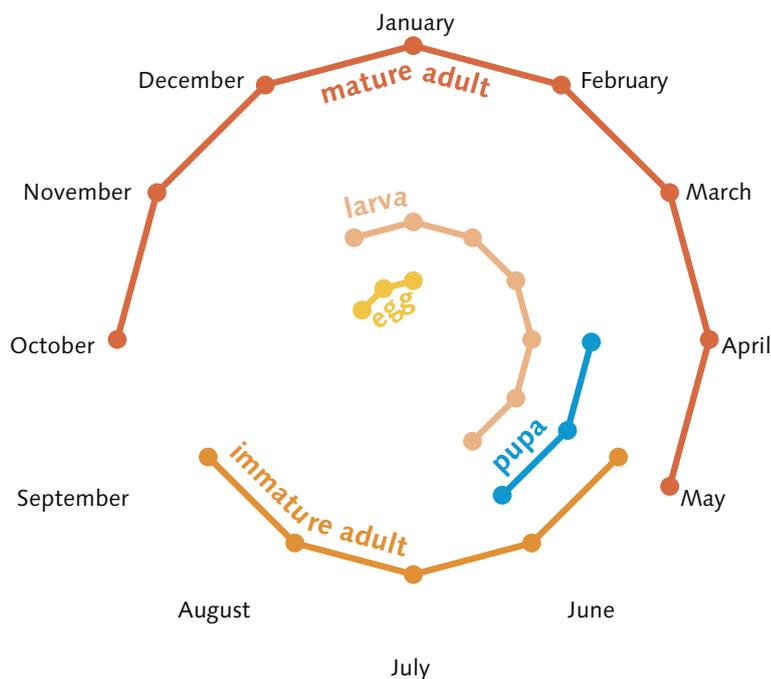


Figure 2: Development of *Tomicus detruens* during a one year monitoring period in experimental plot near Zadar, Croatia.

Abbildung 2: Entwicklungszyklus von *Tomicus detruens* während eines 1-Jahres-Beobachtungszeitraums auf einer Versuchsfläche bei Zadar, Kroatien.

During 2006-2007, monthly inspections were made at one isolated attack area near Zadar. Quantification of developmental stages was done via inspection of attacked timber, evidence of hibernating and estivating beetles, trap logs inspections and excavations of egg, larval, pupal and adult stages. These observations ascertained a clear case of one year developmental cycle with a three-months swarming period (October-December), larval development in winter and spring, and a cease of activity in summer due to estivation of new generation beetles (Figure 2). These findings conform to some research results and differ from others originating within the Mediterranean basin (Nanni and

Tiberi 1997, Gallego et al. 2008, Sabbatini et al. 2008). It is worth noting that we did not observe mixed populations of *T. detruens* and *T. piniperda* in our research plot, as was the case in some of the mentioned reports. The research on *T. detruens* is continuing; in 2009 a new set of kairomonal traps was set up which will further confirm the flight period of adults and consequently, the number of generations (and potential sister broods) on the Croatian coast.

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