

## **AGRILUS SPP. THE MAIN FACTOR OF OAK DECLINE IN POLAND**

Jacek Hilszczański, Andrzej Sierpinski

Forest Research Institute, Sękocin Stary 3, 05-090 Raszyn  
e-mail: [J.Hilszczanski@ibles.waw.pl](mailto:J.Hilszczanski@ibles.waw.pl); [A.Sierpinski@ibles.waw.pl](mailto:A.Sierpinski@ibles.waw.pl)

### **Abstract**

The buprestid beetles, *Agrilus* spp. are present all over Europe. During last years, the populations of this secondary pest insect; especially *A. biguttatus* have increased remarkably in Poland. The beetles have become a significant component in oak dieback. The insect may kill trees very fast, especially weakened by water stress at suitable for oak sites. In Poland *A. biguttatus* attacks stands of almost all ages (>30 years) and the symptoms are very often impossible to notice unless are faded. Sanitary cuttings of infested trees during winter and early spring are so far the only recommended method of control. So far, no monitoring methods have been proposed.

Keywords: *Agrilus* spp., oak decline, Poland

### **1. Introduction**

Oak stands in Poland cover the area of about 630 thousand hectares, what consist about 7% of whole area of forests. The health of those stands has decrease during recent years. According to our observations the main reason of that situation is severe drought and as its effect, decrease of ground water level. This situation benefits pathogens and pests especially buprestids of genus *Agrilus* that became in Poland serious and the main factor of oak dieback.

### **2. Materials and methods**

During the years 2005-2006 the surveys of oak stands in Poland have been conducted. The surveys focused on habitat characteristics and reasons of oak dieback caused by *Agrilus* spp. The information from Forest Information System on sanitary cuttings has been used to detect the most endangered forest districts.

### **3. Results and conclusions**

#### **3.1. The scale of the problem**

Problem of oak dieback is present in whole country but the worst situation is observed on suitable for oak good sites where trees have developed flat root system, which make impossible for trees to utilize low ground water level. At poor sandy sites where trees are characterized by deep root system and are “prepared” for drought, situation looks far better. By drought weakened oak stands react by increase susceptibility to pathogens and pests especially cambium feeders like *Agrilus* spp. especially *A. biguttatus*. Not only old oak stands

traditionally considered to be susceptible for *Agrilus* infestation suffer from severe attacks but also much younger ones about 30-40 years old (Figure 1).



Figure 1. Oak stand (30 years old) with 70 % trees infested by *A. biguttatus*. Jablonna Forest district.

Within last 3 years, salvage of oak wood in Poland increase to unusual amount of over 830 thousand cubic meters. In vast majority this wood was infested by *Agrilus* mainly *A. biguttatus*. Most significant salvage measurements where applied in southwestern part of Poland (Odra valley, Krotoszyn lowland) and eastern part of the country (Figure 2.).

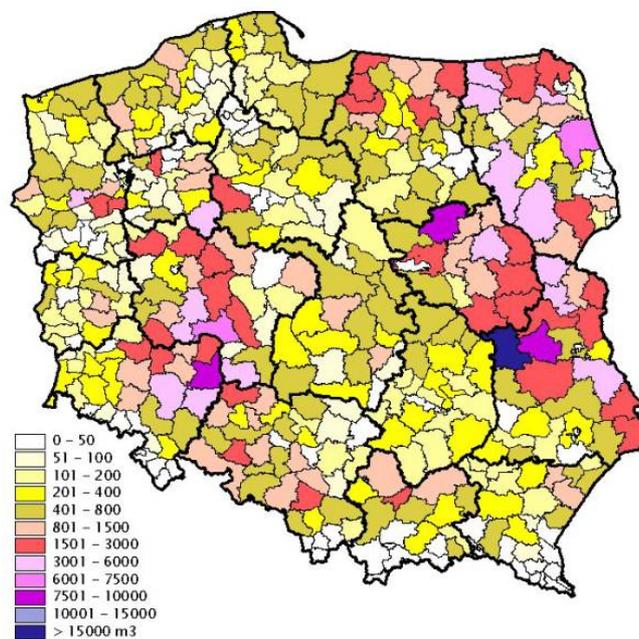


Figure 2. Amounts of salvaged oak wood in forest districts in 2005.

In Poland 28 species of genus *Agrilus* were recorded among them 7 species are related to oak, but only three are considered to be of economical importance and all of them were found during surveys; *A. biguttatus* Oliv., the most important and widespread, *A. sulcicollis* Lac. and *A. angustulus* Ill. (Figure 3). Two last species develop mainly on branches and twigs of oak and are much less dangerous than *A. biguttatus* which attacks stem and its activity very often leads to sudden death of the tree.

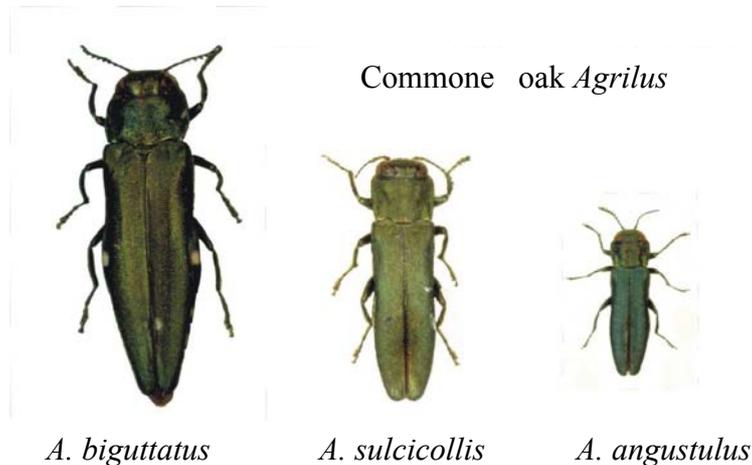


Figure 3. Common *Agrilus* species related to oak.

Biology of oak *Agrilus* species is similar; adults are active from May to July. Larvae feed in cambium, their development probably depends partly on microclimatic conditions on different trees (sun exposition, bark thickness). It was possible to find during one time, for example at the beginning of May very young larvae, the older once and pupae in chambers (Figure 4,). *A. biguttatus* differs from other oak *Agrilus* species by pupating only in bark. Larvae of *A. biguttatus* usually feed perpendicularly to stem girdling the tree around (Figure 5.).



Figure 4. Larva in pupal chamber.



Figure 5. Young larva girdling.

The species is usually first attacking wood living insect. When the population of *A. biguttatus* is very high it attacks trees, which looks healthy without visible symptoms of weakening. There is hard to find preference for more open stands while even trees from second under canopy forest level are very often attacked. Outbreaks of the species could result in mass dying of whole stands of oak as it was observed in Puławy and Krotoszyn forest districts. Details refer to biology; distribution and importance of *A. biguttatus* have been presented by Moraal and Hilszczański (2000).

### 3.2 Symptoms of attack and control measures

The dark cracks with slime flux (Evans et al., 2004) as well as shoots on stem or deformed foliage are considered to be symptoms of *Agrilus* attacks. Our observations proved that in highly infested stands many trees are heavily infested without those symptoms. This situation makes very difficult to detect and salvage trees infested by *Agrilus* during season before leaves are fading as a consequence of larval girdling. It is much easier to recognize infested trees in winter and spring after the woodpeckers had feed on larvae, which are prepared for overwintering in the bark. Woodpeckers remove the upper part of the bark on still living trees what gives a trees characteristic red color easy to notice from the distance (Figure 6.).



Figure 6. Woodpecker activity.



Figure 7. Infested stem debarked.

The main measurements focuses on decrease of the populations of *Agrilus* are therefore sanitary cuttings conducted during winter and early spring till the end of April before new generation of *Agrilus* emerges. The only recommended control method, have to be followed by debarking and liquidation of larvae overwintering in the bark (Figure 7.).

So far, no monitoring method of *Agrilus* populations has been proposed, mainly because difficulties in detection of infested trees and the lack of good attractants and trapping methods.

#### 4. References

EVANS, H.F., MORAAL, L., PAJARES, J.A. 2004. Biology, ecology and economic importance of Buprestidae and Cerambycidae. In "European bark and wood boring insects in living trees: a synthesis", edited by F. Lieutier, K. Day, A. Battisti, J.C. Gregoire and H. Evans. Kluwer. 447-474.

MORAAL, L.G. & J. HILSZCZAŃSKI. 2000: The buprestid beetle, *Agrilus biguttatus* (F.)(Col., Buprestidae), a recent factor in oak decline in Europe. Journal of Pest Science, 5: 134-138.