

Bark Beetles (Scolytidae, Coleoptera) in Slovenia with Special Regard to Species in Burnt Pine Forests

Maja Jurc

University of Ljubljana, Biotechnical Faculty, Department of Forestry and Renewable Forest Resources, Večna pot 83, 1001 Ljubljana, Slovenia

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Ecological conditions in Slovenia are very complex and heterogeneous due to the influence and interaction among the various climatic, tectonic, edaphic, orographic, lithologic - transitional (ecotonic) regions. Slovenia is a meeting-point of the Alps, the Mediterranean, the Dinaric Mountain Region and the Pannonian Lowland. This complexity of ecological factors has created a wide variety of habitats and accounts for the high degree of biodiversity of flora and fauna. As a result of the work of Slovenian entomologists, we now have a preliminary catalogue of species from the family Scolytidae. At last count (Grüne 1979) there were 154 species in the Scolytidae family in Europe. From publications and Slovenian collections (Central Collection of Slovenian Museum of Natural History, Coleoptera-Rhynchophora, S. Brelih; Gspan collection; Collection of the Department of Forestry and Renewable Forest Resources, Biotechnical Faculty, M. Jurc) we have established that there are 88 species from the family Scolytidae in Slovenia:

Scolytus scolytus (Fabricius), *S. laevis* Chapuis, *S. multistriatus* (Marsham), *S. pygmaeus* (Fabricius), *S. ratzeburgi* Janson, *S. intricatus* (Ratzeburg), *S. mali* (Bechstein), *S. rugulosus* (Müller), *S. carpini* (Ratzeburg), *Phloeotribus scarabaeoides* (Bernard), *Phthorophloeus spinulosus* Rey, *Phloeophthorus latus* (Wichmann), *P. geschwindti* (Seitner), *Hylastes ater* (Paykull), *H. opacus* Erichson, *H. linearis* Erichson, *H. attenuatus* Erichson, *H. angustatus* (Herbst), *H. cunicularius* Erichson, *Hylurgops glabratus* (Zetterstedt), *H. palliatus* (Gyllenhal), *Tomicus minor* (Hartig), *T. piniperda* (Linnaeus), *Hylurgus ligniperda* (Fabricius), *Dendroctonus micans* (Kugelann), *Polygraphus poligraphus* (Linnaeus), *P. subopacus* Thomson, *Hylesinus crenatus* (Fabricius), *H. oleiperda* (Fabricius), *Leperesinus fraxini* (Panzer), *Hylastinus obscurus* (Marsham), *H. fankhauseri* (Reitter), *Xylechinus pilosus* (Ratzeburg), *Pteleobius vittatus* (Fabricius), *P. kraatzi* (Eichhoff), *Phloeosinus thujae* (Perris), *Hypoborus ficus* Erichson, *Liparthrum mori* Aube, *L. genistae* Aube, *Crypturgus cinereus* (Herbst), *C. hispidulus* Thomson, *C. pusillus* (Gyllenhal), *Dryocoetes autographus* (Ratzeburg), *D. villosus* (Fabricius), *D. alni* (Georg), *Xylocleptes bispinus* (Duftschmid), *Cryphalus piceae* (Ratzeburg), *C. saltuarius* Weise, *C. abietis* (Ratzeburg), *C. intermedius* Ferrari, *Ernoporus fagi* (Fabricius), *E. caucasicus* (Lindemann), *E. tiliae* (Panzer), *Pityophthorus pityographus* (Ratzeburg), *P. lichtensteini* (Ratzeburg), *P. carniolicus* Wichmann, *P. balcanicus* Pfeffer, *Taphrorychus bicolor* (Herbst), *T. alni* (Pfeffer), *T. villifrons* (Dufour), *Pityogenes chalcographus* (Linnaeus), *P. trepanatus* (Nördlinger), *P. bidentatus* (Herbst), *P. quadridens* (Hartig), *P. bistridentatus* (Eichhoff), *P. conjunctus* (Reitter), *P. calcaratus* (Eichhoff), *Pityokteines curvidens* (Germar), *P. spinidens* (Reitter), *P. vorontzowi* (Jacobson), *Orthotomicus suturalis* (Gyllenhal), *O. laricis* (Fabricius), *O. proximus* (Eichhoff), *O. erosus* (Wollaston), *Ips acuminatus* (Gyllenhal), *I. typographus* (Linnaeus), *I. amitinus* (Eichhoff), *I. cembrae* (Heer), *I. sexdentatus* (Börner), *Xyleborus dispar* (Fabricius), *X. saxeseni* (Ratzeburg), *X. monographus* (Fabricius), *X. pfeilii* (Ratzeburg), *X. dryographus* (Ratzeburg), *X. germanus* Blandford, *Xyloterus domesticus* (Linnaeus), *X. signatus* (Fabricius), *X. lineatus* (Olivier).

Thus, our data show that 57% of European species of the family Scolytidae are currently extant in Slovenia. However, we expect closer to 120 species to be eventually identified in Slovenia according to data in the literature (Jelínek 1993; Pfeffer 1995).

Dendroctonus micans was first recorded in the Gspan collection and later found on location in Podbrezje, Gorenjska region, 1973; it was detected in a gradation in a spruce monoculture near Ormož (northwest part of Slovenia), 2000. In 2001 the beetle was found in 24 small groups (1 to 5 trees) of spruce trees, equal to approximately 80 m³ of wood when the dying trees were cut down.

Bark beetles on fir (*Pityokteines spinidens*, *P. curvidens*, *Cryphalus piceae*, *Pityokteines vorontzowi*) have only been found in a few locations throughout the country in recent years. In 2002, these beetles, combined with the drought from the previous year, caused large gradations in several regions in the central and particularly the southern (Kočevje region) parts of Slovenia. By 1. 7. 2002, about 36,000 m³ of fir and 20,000 m³ of spruce (spruce death was caused by *Ips typographus* and *Pityogenes chalcographus*) had been cut in the Kočevje region.

Species of Bark Beetles in the Burnt Pine Forests of the Kras Region

Within the framework of the project “Forests Fires in Slovenia” (1998-2001, financed by the Ministry of Science and Technology and the Ministry of Defence), we studied the abiotic (soil) and biotic (succession of vegetation, nourishment of some herbivores, entomofauna) parameters at chosen locations in limestone and flich regions of Kras. A study of the impact of fires on the insects in trunks in burnt-out areas of Austrian pine plantations (*Pinus nigra* Arn.) was carried out in the Kras region from 1999 to 2001. The work was performed in three locations differing from one another in terms of soil condition, size of burnt areas, as well as in the type and duration of burning.

Methods

We collected various species of insects at each location, at three times during the year (May, June/July, September) from under a 50 x 50 cm bark patch at breast height from five Austrian pine trees chosen at random. A Shannon –Wiener Diversity Index was used in order to demonstrate and explain the diversity of the insects collected at the different experimental locations.

Locations

P1. Mlave: August 2000, over an area of 2.4 ha, crown fire, vegetation at location: Austrian pine forest – *Seslerio autumnalis*-*Pinetum nigrae*.

P2. Kojnik: April 1998, over an area of 46 ha, characterized by a ground and crown fire, pastures as well as Austrian pine forest and thermophilic deciduous trees.

P3. Podgovci: August 1998, over an area of 7.53 ha, ground fire, Austrian pine forest –*Seslerio autumnalis*-*Pinetum nigrae*.

Results

We collected a total of 1590 specimens from the family Scolytidae. The identified species are listed in Table 1.

The highest index of entomofauna diversity was found in the youngest burnt area while the lowest index was found in the oldest burnt area. We can conclude that the most suitable habitat for the species found occurs on freshly damaged trees, while aging and dried-out material served as less suitable habitats for bark beetles.

Table 1.—Survey of insects collected in pine monocultures in trunks of declining and dead Austrian pine trees in Kojnik (P1), Podgovci (P2) in Mlave (P3) from 1999 to 2001.

Family SCOLYTIDAE	P1	P2	P3	TOTAL
<i>Ips sexdentatus</i> (Börner)	964	7	220	1191
<i>Ips acuminatus</i> (Gyllenhal)		8		8
<i>Orthotomicus laricis</i> (Fabricius)	158	7	7	169
<i>Orthotomicus suturalis</i> (Gyllenhal)		2		2
<i>Pityogenes chalcographus</i> (Linnaeus)	131			131
<i>Pityogenes trepanatus</i> (Nördlinger)			6	6
<i>Pityogenes bistridentatus</i> (Eichhoff)			45	45
<i>Tomicus minor</i> (Hartig)	3		2	5
<i>Tomicus piniperda</i> (Linnaeus)		2		2
<i>Hylastes ater</i> (Paykull)	14	1		15
<i>Hylastes</i> Erichson, (two species)	12	4		16
Total	1282	31	277	1590

References Cited

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