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# Review of Scolytinae (Coleoptera, Curculionidae) of Serbia

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## ABSTRACT

The list of Scolytinae of Serbia was made based on the data that has been published so far and the unpublished data collected in the period from 1991 to 2023. In it, 96 species are listed in total. The Scolytinae fauna has not been sufficiently studied in Serbia. It is presumed that there are about 20 more species present in Serbian fauna.

*Keywords:* Fauna, xylophagous, bark beetles, ambrosia beetles.

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## INTRODUCTION

Scolytinae are small insects (0,5-12 mm). They usually develop under the bark or in the wood of various trees and shrubs, while some tropical species can develop in seeds (Iku et al, 2018). They usually inhabit physiologically weakened and freshly felled material (Marković & Stojanović, 2001, 2003). However, certain species attack completely healthy trees during outbreaks. This consequently causes their dieback (Grégoire et al., 2015; Fernandez-Carrillo et al, 2020). Some Scolytinae species can also cause indirect damage to forests as they serve as vectors of some pathogens (Marković & Stojanović, 2003, 2011; Santini & Faccoli, 2015). Due to their importance, they have always attracted the attention of foresters and entomologists.

So far, about 5,800 species of Scolytinae have been described in the world (Wood, 2007). The first written information about their fauna in Serbia was given by Langhoffer (1915). From then until the end of the Second World War, they were not researched extensively in Serbia when Professor Dr. Svetislav Živojinović started studying them (Marković, 2013). After his death in 1966, Professor Dr. Dragić Tomić and forestry engineer Miroslav Stevanović continued the research on the Scolytinae fauna of Serbia. Their research ended in the 1990s, and was continued by Dr. Čedomir Marković and agricultural engineer Aleksandar Stojanović to this day.

The first faunistic list of Scolytinae of Serbia was made in 1997 (Marković & Stojanović, 1997a). How 25 years have passed since then and many new data on their fauna have been collected (Marković & Stojanović, 1997b, c, 1999, 2000a, b, c, 2001, 2003, 2004, 2005, 2010, 2011, 2012, 2014, 2015, 2019, 2020; Marković, Stojanović, & Milenković, 1997; Manojlović, 1998; Stevanović, 1998; Marković, 1999, 2005, 2011, 2012, 2013; Manojlović et al, 2000a, b, 2001; 2003; Stojanović & Marković, 2001, 2007; Milošević, 2003; Roganović, 2003; Marković, Jančić, & Milanović, 2004; Tabaković-Tošić & Milosavljević, 2015, 2016, 2018a, b; Milosavljević et al, 2021a, b, 2022; Češljar et al, 2022; Vujić & Vesović, 2022) there was a need to create a new list of species and to determine: 1. which species of Scolytinae have been reported in Serbia so far; 2. how well are the Scolytinae investigated in Serbia. That new list of species can be found in this paper.

## MATERIAL AND METHODS

The species list presented in this paper was compiled based on the data on the Scolytinae fauna that have been published in Serbia so far and unpublished data collected by Čedomir Marković and Aleksandar Stojanović in the period from 1992 to 2023 at 46 sites (Table 1) in Serbia. The trees inhabited by Scolytinae were sought at the localities where the research was conducted. If the Scolytinae adults were found on them, they were collected in glass vials and killed by ether. However, if their larvae or pupae were found, 30-50 cm long pieces of wood were cut from the inhabited parts of the trees. They were then brought to the laboratory of the Faculty of Forestry, the University of Belgrade where they were placed in photoeclectors to obtain adults. At

the time of their appearance, the photoeclectors were inspected daily. The emerged adults were collected, killed by ether, prepared, and identified.

The identification of the collected material was carried out by Čedomir Marković using the published works of Balachowsky (1949), Stark (1952), Nunberg (1954), Karaman (1971), and Pfeffer (1989). The data obtained this way and the already published data were entered into a database from which a list of the species that have been recorded in Serbia so far was derived. The names of the species used in it are coordinated with the names given by Alonso-Zarazaga (2013) for this group of insects. The localities mentioned in the database are grouped according to the geographic entities (mountains) or administrative units (municipalities, urban areas) to which they belong.

Table 1. List of investigated localities.

| Locality | Coordinates | | Average altitude (m) |
|---|---|---|---|
| | N | E | |
| Aleksinac | | | |
| Brdjanka | 43°32'0" | 21°42'42" | 185 |
| Paniče | 43°33'57" | 21°42'45" | 245 |
| Rujevica | 43°32'46" | 21°43'6" | 235 |
| Arandjelovac | | | |
| Banja | 44°17'15" | 20°37'30" | 190 |
| Belgrade | | | |
| Bojčin Forest | 44°44'19" | 20°8'52" | 90 |
| Košutnjak | 44°46'50" | 20°25'38" | 130 |
| Lipovica Forest | 44°38'51" | 20°24'15" | 285 |
| Stepin gaj | 44°44'59" | 20°32'2" | 260 |
| Trešnja | 44°37'29" | 20°34'21" | 190 |
| Ušće | 44°49'30" | 20°25'18" | 80 |
| Brus | | | |
| Milentija | 43°25'48" | 20°58'37" | 620 |
| Ćuprija | | | |
| Mijatovac | 43°57'15" | 21°19'50" | 120 |
| Deliblato Sands | | | |
| Čardak | 44°51'50" | 21°3'43" | 135 |
| Kučevo | | | |
| Majdan Kučajna | 44°26'50" | 21°36'56" | 355 |
| Loznica | | | |
| Gornja Koviljača | 44°29'2" | 19°8'22" | 170 |
| Grnčara | 44°31'15" | 9°17'35" | 220 |
| Majdanpek | | | |
| Debeli Lug | 44°20'19" | 21°53'52" | 430 |
| Mt. Bukovik | 43°41'15" | 21°40'13" | 530 |
| Mt. Goč | | | |
| Brezna | 43°34'1" | 20°40'44" | 650 |
| Brezjak | 43°33'52" | 20°43'23" | 870 |
| Ravnine | 43°34'13" | 20°40'9" | 830 |
| Mt. Avala | 44°41'25" | 0°30'29" | 375 |
| Mt. Kamenički vis | | | |
| Gradac | 43°22'36" | 21°59'59" | 590 |

| Locality | Coordinates | | Average altitude (m) |
|---|---|---|---|
| | N | E | |
| Mt. Kopaonik | | | |
| Barska river | 43°17'36" | 20°45'37" | 1385 |
| Hajdučka voda | 43°18'9" | 20°47'7" | 1600 |
| Jankova bara | 43°19'12" | 20°46'27" | 1480 |
| Kadijevac | 43°19'3" | 20°45'46" | 1450 |
| Karaman | 43°17'11" | 20°49'31" | 1885 |
| Saborište | 43°17'1" | 20°48'19" | 1730 |
| Samokovska river | 43°20'31" | 20°44'50" | 1240 |
| Mt. Povlen | | | |
| Vujinovača | 44°10'34" | 19°43'2" | 780 |
| Smiljevo polje | 44°7'35" | 19°39'32" | 975 |
| Mt. Tara | | | |
| Kaludjerske Bare | 43°53'42" | 19°33'18" | 1120 |
| Predov Krst | 43°56'24" | 19°18'37" | 1085 |
| Studenac, Klade | 43°53'28" | 19°19'33" | 1225 |
| Negotin | 44°13'58" | 22°31'46" | 45 |
| Obrenovac | | | |
| Draževac | 44°34'51" | 44°34'51" | 95 |
| Pirot | 43°9'22" | 22°34'59" | 370 |
| Pristina | | | |
| Lipljan, Lipovica hunting area | 42°32'59" | 21°0'8.04" | 630 |
| Raška | | | |
| Gnjilica | 43°15'4" | 20°38'4" | 520 |
| Zimovnik, Breze, Vilje kolo | 43°19'2" | 20°43'54" | 1270 |
| Ražanj | | | |
| Ražanj | 43°40'22" | 21°32'55" | 280 |
| Praskovče | 43°37'19" | 21°31'41" | 215 |
| Ruma | | | |
| Karakuša | 44°48'11" | 19°45'24" | 85 |
| Sjenica | | | |
| Pape | 43°16'24" | 20°1'27" | 1025 |
| Vlasotince | | | |
| Donja Lopušnja | 42°55'27" | 22°10'33" | 815 |

## RESULTS

Based on the data obtained 96 species of Scolytinae from 17 tribes and 34 genera were identified (Table 2). During our research, the findings of 25 species from 12 tribes and 16 genera were confirmed.

Table 2. Scolytinae recorded in Serbia*.

| | Species | Reference/New finding |
|---|---|---|
| | Tribus Corthylini | |
| 1 | *Pityophthorus balcanicus* Pfeffer, 1940 | Karaman, 1971 |
| 2 | *P. glabratus* Eichhoff, 1878 | Reference: Mamontov, 1937; Živojinović, 1954a, b; Maksimović& Milanović, 1964; Živojinović & Živojinović, 1969; Radonjić & Tomić, 1995; Marković, 2013 |
| 3 | *P. lichtensteinii* (Ratzeburg, 1837) | Reference: Tomić, 1954; Živojinović, 1954a, 1960; Stevanović, 1987; Radonjić & Tomić, 1995; Roganović, 2003; Marković, 2013 |
| 4 | *P. micrographus* (Linnaeus, 1758) | Reference: Živojinović, 1948, 1950b, 1954a, 1961; Janković, 1949; Tomić, 1954; Maksimović & Barlov, 1961; Maksimović & Milanović, 1961, 1964 |

| | Species | Reference/New finding |
|---|---|---|
| 5 | *P. pityographus* (Ratzeburg, 1837) | New finding: Aleksinac, Brdjanka 11.9.1993. on *Pinus nigra* Arn.; Belgrade: Košutnjak 9.12.1992. on *P. omorica* (Pančić) Purk., 18.2.1993. on *Cedrus* sp., 3.2.1996. on *P. nigra*, 2.2.1996. on *P. silvestris* L., Stepin gaj 7.3.1993. on *P. nigra*; Mt. Avala 25.7.1995. on *Picea abies* (L.) Karst.; Mt. Tara, Studenac, Klade 27.7.1993. on *P. omorica*.<br>Reference: Živojinović, 1960, 1961; Janković, 1972; Stevanović, 1987; Adamović, 1990; Marković & Stojanović, 2000a; Roganović, 2003; Marković, 2013 |
| | Tribus Cryphalini | |
| 6 | *Cryphalus abietis* (Ratzeburg, 1837) | Reference: Živojinović, 1950b; Radonjić & Tomić, 1995; Marković, 2013 |
| 7 | *C. piceae* (Ratzeburg, 1837) | New finding: Mt. Goč, Brezjak 20.7.2005. on *P. abies*.<br>Reference: Idrizović, 1947; Živojinović, 1948, 1950b, 1954a, 1961; Janković, 1949; Tomić, 1954, 1957; Adamović, 1990; Marković & Stojanović, 2000a; Roganović, 2003; Marković, 2013 |
| 8 | *C. saltuarius* Weise 1891 | Reference: Živojinović, 1950b |
| 9 | *Ernoporicus caucasicus* (Lindemann, 1876) | Reference: Marković & Stojanović 2000c, 2015; Marković, 2013 |
| 10 | *E. fagi* (Fabricius, 1798) | Reference: Živojinović, 1954a; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; 2015 |
| 11 | *Ernoporus tiliae* (Panzer, 1793) | Reference: Živojinović & Živojinović, 1969; Radonjić & Tomić, 1995; Marković, 2013; Marković & Stojanović, 2015 |
| 12 | *Trypophloeus asperatus* (Gyllenhal, 1813) | Reference: Langhoffer, 1915; Živojinović & Živojinović, 1969 |
| 13 | *T. granulatus* (Ratzeburg, 1837) | Reference: Langhoffer, 1915 |
| | Tribus Crypturgini | |
| 14 | *Crypturgus cinereus* (Herbst, 1793) | Reference: Živojinović, 1950b, 1954a, 1961; Živojinović & Živojinović, 1969; Karaman, 1971; Stevanović, 1987; Marković & Stojanović, 2000a, b; Marković, 2013 |
| 15 | *C. cribellus* Reitter, 1894 | Reference: Stevanović, 1987; Marković & Stojanović, 2000a, b; Roganović, 2003; Marković, 2013 |
| 16 | *C. pusillus* (Gyllenhal, 1813) | Reference: Janković, 1949; Žojinović, 1950b, 1954a; Tomić, 1954; Stevanović, 1987; Adamović, 1990; Marković & Stojanović, 2000a, b; Marković, 2013 |
| | Tribus Dryocoetini | |
| 17 | *Dryocoetes autographus* (Ratzeburg, 1837) | Reference: Živojinović, 1950b; Tomić, 1954, 1957; Janković, 1972; Stevanović, 1987; Tomić et al, 1992; Radonjić & Tomić, 1995; Roganović, 2003; Marković, 2013 |
| 18 | *D. hectographus* Reitter, 1913 | Reference: Marković, 2013 |
| 19 | *D. villosus* (Fabricius, 1792) | Reference: Živojinović & Živojinović, 1969 |
| 20 | *Lymantor aceris* (Lindemann, 1875) | Reference: Karaman, 1971 |
| 21 | *L. coryli* (Perris, 1853) | Reference: Langhoffer, 1915 |
| 22 | *Xylocleptes bispinus* (Duftschmid, 1825) | Reference: Langhoffer, 1915; Karaman, 1971; Radonjić & Tomić, 1995; Marković & Stojanović, 2015 |
| | Tribus Hylastini | |
| 23 | *Hylastes angustatus* (Herbst, 1793) | New finding: Ćuprija, Mijatovac 1.9.1993. on *P. nigra*; Pirot 1.12.1992. on *P. nigra*.<br>Reference: Mamontov, 1937; Živojinović & Živojinović, 1969; Kovačević, 1982; Stevanović, 1987; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; Marković, 2013 |
| 24 | *H. ater* (Paykull, 1800) | Reference: Tomić, 1954; Živojinović, 1960; Živojinović & Živojinović, 1969; Kovačević, 1982; Stevanović, 1987; Roganović, 2003; Marković, 2013 |
| 25 | *H. attenuatus* Erichson, 1836 | Reference: Živojinović & Živojinović, 1969 |
| 26 | *H. cunicularius* Erichson, 1836 | Reference: Živojinović, 1950b; Tomić, 1957; Kovačević, 1982; Roganović, 2003; Marković, 2013 |
| 27 | *H. linearis* Erichson, 1836 | Reference: Živojinović, 1960; Marković & Stojanović, 2000a |
| 28 | *H. opacus* Erichson, 1836 | Reference: Marković & Stojanović, 2000a |
| 29 | *Hylurgops palliatus* (Gyllenhal, 1813) | New finding: Majdanpek, Debeli Lug 27.5.1992.on *P. nigra*; Mt. Goč, Ravnine 20.7.2005. on *P. nigra*; Mt. Tara, Predov Krst 19.9.2005. on *P. abies*.<br>Reference: Živojinović, 1950b, 1960, 1961; Tomić, 1954, 1957; Janković, 1972; Stevanović, 1987; Adamović, 1990; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; Roganović, 2003; Marković, 2013 |

| | Species | Reference/New finding |
|---|---|---|
| | Tribus Hylesinini | |
| 30 | *Hylastinus obscurus* (Marsham, 1802) | Reference: Langhoffer, 1915 |
| 31 | *Hylesinus crenatus* (Fabricius, 1787) | Reference: Živojinović, 1950a, 1961; Živojinović & Živojinović, 1969; Karaman, 1971; Radonjić & Tomić, 1995; Marković, 2013 |
| 32 | *H. fraxini* (Panzer, 1779) | Reference: Živojinović, 1950a, 1954a, 1961; Tunguz, 1951; Ogrizek, 1955; Grujić, 1956; Živojinović & Živojinović, 1969; Tomić et al, 1992; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a, 2015; Marković, 2013 |
| 33 | *H. toranio* (Danthoine, 1788) | Reference: Langhoffer, 1915; Živojinović, 1954a; Ogrizek, 1955; Grujić, 1956; Živojinović & Živojinović, 1969; Marković & Stojanović, 2000b, 2015; Marković, 2013 |
| 34 | *H. wachtli* Reitter, 1887 | Reference: Živojinović, 1954a; Živojinović & Živojinović, 1969 |
| 35 | *Kissophagus hederae* (Schmitt, 1843) | Reference: Marković & Stojanović, 2014 |
| 36 | *Pteleobius kraatzi* (Eichhoff, 1864) | Reference: Langhoffer, 1915; Manojlović, 1973; Maksimović, 1979; Manojlović et al, 2000a, 2003; Marković, 2013 |
| 37 | *P. vittatus* (Fabricius, 1787) | Reference: Langhoffer, 1915; Živojinović & Živojinović, 1969; Karaman, 1971; Marković & Stojanović, 2000b, 2012, 2015, 2020; Stojanović & Marković, 2007; Marković, 2013 |
| | Tribus Hypoborini | |
| 38 | *Hypoborus ficus* Erichson, 1836 | Reference: Langhoffer, 1915; Vujić & Vesović, 2022 |
| | Tribus Ipini | |
| 39 | *Ips acuminatus* (Gyllenhal, 1827) | Reference: Živojinović, 1948, 1954a, b; Tomić, 1954; Maksimović & Milanović, 1964; Živojinović & Živojinović, 1969; Kovačević, 1982; Stevanović, 1987; Adamović, 1990; Marković, 2013, Tabaković-Tošić & Milosavljević, 2015 |
| 40 | *I. amitinus* (Eichhoff, 1871) | Reference: Idrizović, 1947; Živojinović, 1948, 1950b, 1960, 1961 |
| 41 | *I. mansfveldi* (Wachtl, 1879) | Reference: Živojinović, 1954a; Živojinović & Živojinović, 1969; Stevanović, 1987; Adamović, 1990; Radonjić & Tomić, 1995; Marković, 2013 |
| 42 | *I. sexdentatus* (Börner, 1776) | New finding: Aleksinac, Brdjanka 11.9.1993. on *P. nigra*; Belgrade: Ušće 25.4.1993. on *P. nigra*, Stepin gaj 9.6.1997 on *P. nigra*; Mt. Avala 27.5.1995, 21.2.1998. on *P. nigra*; Mt. Bukovik 5.8.2015. on *P. nigra*; Mt. Kamenički vis, Gradac 4.7.2005. on *P. nigra*; Negotin 24.9.1993. on *P. nigra*; Raška, Zimovnik, Breze, Vilje kolo 16.4.1994. on *Pinus* sp.<br>Reference: Idrizović, 1947; Živojinović, 1948, 1954a, 1960; Živojinović & Živojinović, 1969; Stevanović, 1987; Adamović, 1990; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; Roganović, 2003; Marković, 2013 |
| 43 | *I. typographus* (Linnaeus, 1758) | New finding: Mt. Kopaonik: Barska river 16.7.2008. on *P. abies*, Hajdučka voda 30.5.2001. on *P. abies*, Jankova bara 1.8.2006. on *P. abies*, Kadijevac 30.5.2001. on *P. abies*, Karaman 30.5.2001. on *P. abies*, Marine vode 16.7.2008. on *P. abies*, Samokovska river 1.8.2006. on *P. abies*; Mt. Tara: Šljivovica 17.5.2001. on *P. abies*, Predov Krst 19.9.2005. on *P. abies*.<br>Reference: Mamontov, 1937; Idrizović, 1947; Živojinović, 1948, 1950b, 1960, 1961; Tomić, 1954, 1957; Živojinović & Petrović, 1955; Damnjanović, 1955; Maksimović & Milanović, 1961, 1964; Maksimović & Bošković, 1962; Janković, 1972; Vasić et al, 1982; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a, 2010; Marković et al, 2004; Marković, 2012, 2013; Roganović, 2003; Tabaković-Tošić & Milosavljević, 2015, 2016, 2018; MIlosavljević et al, 2021a, 2021b, 2022; Češljar et al, 2022 |
| 44 | *Orthotomicus erosus* (Wollaston, 1857) | New finding: Aleksinac: Brdjanka 3.1.1994., 28.1.1994., 18.5.1996. on *P. nigra*, Paniče 28.1.1994. on *P. nigra*; Belgrade: Košutnjak 18.2.1992., 11.2.1993., 14.3.1996. on *P. nigra*, 2.2.1996. on *P. silvestris*, Lipovica Forest 20.2.1992. on *P. nigra,* Trešnja 2.2.1993. on *P. nigra*; Ćuprija, Mijatovac 30.11.1992. on *P. nigra*; Deliblato Sands, Čardak 8.7.2005. on *P. silvestris*; Mt. Avala 8.6.2005. on *P. nigra*; Mt. Kamenički vis, Gradac 4.7.2005. on *P. nigra*.<br>Reference: Mamontov, 1937; Tunguz, 1951; Živojinović, 1954a; Kovačević, 1982; Stevanović, 1987; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; Marković, 2013 |
| 45 | *O. laricis* (Fabricius, 1792) | New finding: Aleksinac, Brdjanka 11.9.1993. *P. nigra*.<br>Reference: Živojinović, 1950b; Kovačević, 1982; Stevanović, 1987; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; Marković, 2013 |
| 46 | *O. longicollis* (Gyllenhal, 1827) | Reference: Marković & Stojanović, 2000a; Marković, 2013 |
| 47 | *O. proximus* (Eichhoff, 1867) | Reference: Grujić, 1956; Živojinović & Živojinović, 1969; Kovačević, 1982; Adamović, 1990; Marković, 2013 |

| | Species | Reference/New finding |
|---|---|---|
| 48 | *O. suturalis* (Gyllenhal, 1827) | New finding: Vlasotince, Donja Lopušnja 17.9.1993. on *P. nigra*.<br>Reference: Tomić, 1954; Živojinović, 1954a; Živojinović & Živojinović, 1969; Kovačević, 1982; Stevanović, 1987; Marković & Stojanović, 2000a, b; Marković, 2013 |
| 49 | *Pityogenes bidentatus* (Herbst, 1784) | New finding: Aleksinac, Paniče 28.1.1994. on P. nigra; Ćuprija, Mijatovac 1.9.1993. on *P. nigra*; Raška, Zimovnik, Breze, Vilje kolo 16.4.1994. on *Pinus* sp.; Ražanj, Praskovče 20.5.1996. on *P. nigra*.<br>Reference: Živojinović, 1954a, b, 1961; Živojinović & Živojinović, 1969; Kovačević, 1982; Stevanović, 1987; Adamović, 1990; Marković, 2013 |
| 50 | *P. bistridentatus* (Eichhoff, 1878) | New finding: Aleksinac: Brdjanka 11.9.1993., 28.1.1994, 18.5.1996. on *P. nigra*, Paniče 28.1.1994. on *P. nigra*; Belgrade: Košutnjak 11.2.1993., 18.2.1993., 14.3.1996. on *P. nigra*, Lipovica Forest 20.2.1993. on *P. nigra*, Trešnja 2.2.1993. on *P. nigra*, Stepin gaj 7.3.1993. on *P. nigra*; Brus, Milentija 10.9.1993. on *P. nigra*; Ćuprija, Mijatovac 1.9.1993. on *P. nigra*; Deliblato Sands, Čardak 8.7.2005. on *P. silvestris*; Kučevo, Majdan Kučajna 23.6.2005. on *P. nigra*; Loznica, Grnčara 16.9.1992. on *P. strobus*; Mt. Avala 8.6.2005. on *P. nigra*; Mt. Goč, Ravnine 20.7.2005. on *P. nigra*; Mt. Kamenički vis, Gradac 4.7.2005. on *P. nigra*; Mt. Povlen: Smiljevo Polje 1.8.2005. on *P. nigra*, Vujinovača 1.8.2005., 16.9.2005. on *P. nigra*; Pirot 1.12.1992. on *P. nigra*; Raška, Gnjilica 2.10.1992. on *P. strobus*; Sjenica, Pape 27.5.1992. in flight.<br>Reference: Mamontov, 1937; Živojinović, 1948, 1954a, b, 1960, 1961; Živojinović & Živojinović, 1969; Kovačević, 1982; Stevanović, 1987; Adamović, 1990; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; Roganović, 2003; Marković, 2013 |
| 51 | *P. chalcographus* (Linnaeus, 1761) | New finding: Mt. Kopaonik, Samokovska river 16.7.2008. on P. abies; Mt. Tara, Kaludjerske Bare 19.9.2014. on P. abies; Sjenica, Pape 27.5.1992 in flight.<br>Reference: Mamontov, 1937; Idrizović, 1947; Živojinović, 1948, 1950b, 1954a, 1960, 1961; Tomić, 1954, 1957; Živojinović & Petrović, 1955; Maksimović & Milanović, 1961; Maksimović & Barlov, 1961; Maksimović & Bošković, 1962; Vasić et al, 1982; Stevanović, 1987; Marković & Stojanović, 2000a, 2010; Marković et al, 2004; Roganović, 2003; Marković, 2012, 2013; Tabaković-Tošić & Milosavljević, 2016; Češljar et al, 2022 |
| 52 | *P. quadridens* (Hartig, 1834) | Reference: Živojinović, 1954a, 1960, 1961; Maksimović & Milanović, 1964; Živojinović & Živojinović, 1969; Kovačević, 1982; Stevanović, 1987; Adamović, 1990; Marković & Stojanović, 2000a; Marković, 2013 |
| 53 | *P. trepanatus* (Nordlinger, 1848) | Reference: Živojinović, 1960, 1961; Marković, 2013 |
| 54 | *P. monacensis* Fuchs, 1911 | Reference: Živojinović, 1961 |
| 55 | *Pityokteines curvidens* (Germar, 1824) | Reference: Idrizović, 1947; Živojinović, 1948, 1950b, 1954a, 1961; Janković, 1949; Grujić, 1956; Maksimović & Milanović, 1964; Adamović, 1990; Marković & Stojanović, 2000a; Roganović, 2003; Marković, 2013 |
| 56 | *P. spinidens* (Reitter, 1894) | Reference: Janković, 1949; Živojinović, 1950b, 1954a, 1961; Tomić, 1954; Adamović, 1990; Marković & Stojanović, 2000a; Roganović, 2003; Marković, 2013 |
| 57 | *P. vorontzovi* (Jakobson, 1895) | Reference: Živojinović, 1948, 1950b, 1954a, 1961; Janković, 1949; Tomić, 1954, 1957; Adamović, 1990; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; Marković, 2013 |
| | Tribus Phloeosinini | |
| 58 | *Phloeosinus aubei* (Perris, 1855) | Reference: Živojinović, 1961; Kovačević, 1982; Tomić et al, 1992; Marković & Stojanović, 2000a, b, 2004; Marković, 2013 |
| 59 | *Ph. thujae* (Perris, 1855) | New finding: Aleksinac, Brdjanka 30.10.1993. on *Thuja occidentalis* L.; Arandjelovac, Banja 29.4.1992. in flight; Belgrade, Košutnjak 17.6.2005. on *Juniperus* sp.; Mt. Kopaonik, Saborište 30.5.2001. on *Juniperus communis* L.; Mt. Tara, Kaludjerske Bare 16.9.2005. on *Chamaecyparis lawsoniana* (A. Murray) Parlatore; Obrenovac, Draževac 3.6.1993. by Malaise trap; Ražanj 19.9.1993. on *Th. Occidentalis*.<br>Reference: Živojinović, 1954a; Živojinović & Živojinović, 1969; Tomić et al, 1992.; Milijašević et al, 1994; Marković & Stojanović, 2000a, 2004; Marković, 2013 |
| | Tribus Phloeotribini | |
| 60 | *Phloeotribus brevicollis* (Kolenati, 1846) | Reference: Marković & Stojanović, 1999 |
| 61 | *Ph.caucasicus* Reitter, 1891 | Reference: Marković & Stojanović, 1997b |
| | Tribus Polygraphini | |
| 62 | *Carphoborus minimus* (Fabricius, 1798) | New finding: Raška, Zimovnik, Breze, Vilje kolo 16.4.1994. on *Pinus* sp.<br>Reference: Živojinović, 1954a, 1961; Maksimović & Milanović, 1964; Živojinović & Živojinović, 1969; Marković, 2013 |
| 63 | *C. perrisi* (Chapuis, 1869) | Reference: Živojinović & Živojinović, 1969 |
| 64 | *Polygraphus grandiclava* Thomson, 1886 | Reference: Živojinović, 1961 |

| | Species | Reference/New finding |
|---|---|---|
| 65 | *P. polygraphus* (Linnaeus, 1758) | Reference: Živojinović, 1950b; Tomić, 1954, 1957; Živojinović, 1961; Roganović, 2003; Marković, 2013 |
| 66 | *P. subopacus* Thomson, 1871 | Reference: Živojinović, 1961 |
| | Tribus Scolytini | |
| 67 | *Scolytus carpini* (Ratzeburg, 1837) | Reference: Živojinović, 1954a; Radonjić & Tomić, 1995; Marković & Stojanović, 2015 |
| 68 | *S. ensifer* Eichhoff, 1881 | New finding: Aleksinac, Rujevica 15.4.2023. on *Ulmus* sp.<br>Reference: Manojlović, 1973; Marković et al, 1997; Marković & Stojanović, 2000a, b, 2012, 2015; Manojlović et al, 2000a, b, 2003; Stojanović & Marković, 2007; Marković, 2011 |
| 69 | *S. intricatus* (Ratzeburg, 1837) | New finding: Aleksinac, Rujevica 15.4.2023. on *Quercus cerris* L.; Loznica, Gornja Koviljača 12.4.2023. on *Q. cerris* and *Q. frainetto* Ten.; Mt. Kamenički vis, Gradac 18.8.2013. on *Q. cerris*; Ruma, Karakuša 12.4.2023. on *Q. robur* L.<br>Reference: Živojinović, 1954a; Grujić, 1956; Živojinović & Živojinović, 1969; Marković, 1995, 1999, 2005, 2013; Marković & Stojanović, 1996, 2000a, 2001, 2003, 2005, 2011, 2015; Milošević, 2003 |
| 70 | *S. kirschi* Skalitzky, 1876 | Reference: Grujić, 1956; Marković et al, 1997., Marković & Stojanović, 2000b, 2012, 2015; Stojanović & Marković, 2007; Marković, 2011, 2013 |
| 71 | *S. laevis* Chapuis, 1869 | Reference: Marković & Stojanović, 1997a, 2000a 2012; Stojanović & Marković, 2007; Marković, 2011 |
| 72 | *S. mali* (Bechstein, 1805) | Reference: Langhoffer, 1915; Radosavljević, 1938; Živojinović, 1954a; Grujić, 1956; Radonjić & Tomić, 1995; Marković, 2013; Marković & Stojanović, 2015 |
| 73 | *S. multistriatus* (Marsham, 1802) | Reference: Langhoffer, 1915; Tunguz, 1951; Grujić, 1956; Živojinović, 1961; Živojinović & Živojinović, 1969; Manojlović, 1973, 1986a, b; Maksimović, 1979; Karaman, 1971; Vrkić, 1989; Radonjić & Tomić, 1995; Manojlović et al, 2000a, b, 2001, 2003; Marković & Stojanović, 2000a, 2012, 2015; Stojanović & Marković, 2007; Marković, 2011, 2013 |
| 74 | *S. pygmaeus* (Fabricius, 1787) | New finding: Aleksinac, Rujevica 15.4.2023. on *Ulmus* sp.<br>Reference: Živojinović & Živojinović, 1969; Karaman, 1971; Manojlović, 1973, 1986b, 1998; Maksimović, 1979; Marković et al, 1997; Marković & Stojanović, 2000a, b, 2012, 2015; Manojlović et al, 2000a, b, 2001, 2003; Stojanović & Marković, 2007; Marković, 2011, 2013 |
| 75 | *S. ratzeburgi* Janson, 1856 | Reference: Živojinović, 1954a; Tomić, 1954; Živojinović & Živojinović, 1969; Radonjić & Tomić, 1995; Marković, 2013; Marković & Stojanović, 2015 |
| 76 | *S. rugulosus* (Muller, 1818) | New finding: Mt. Goč, Brezjak 20.5.1997. on *Prunus avium* L.<br>Reference: Langhoffer, 1915; Živojinović & Živojinović, 1969; Vrkić, 1989; Radonjić & Tomić, 1995; Mihajlović et al, 1994; Marković & Stojanović, 2000a, 2015; Stojanović & Marković, 2001; Marković, 2013 |
| 77 | *S. scolytus* (Fabricius, 1775) | Reference: Langhoffer, 1915; Ogrizek, 1955; Grujić, 1956; Živojinović, 1961; Živojinović & Živojinović, 1969; Karaman, 1971; Manojlović, 1973, 1986b; Maksimović, 1979; Vrkić, 1989; Manojlović & Sivčev, 1995a, b; Radonjić & Tomić, 1995; Manojlović et al, 2000a, b, 2001, 2003; Stojanović & Marković, 2007; Marković & Stojanović, 2012, 2015; Marković, 2011, 2013 |
| | Tribus Taphrorychini | |
| 78 | *Taphrorychus bicolor* (Herbst, 1793) | Reference: Mamontov, 1937; Živojinović, 1950a, 1954a, 1961; Tomić, 1954, 1957; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a, 2015; Marković, 2013 |
| 79 | *T. villifrons* (Dufour, 1843) | New finding: Loznica, Gornja Koviljača 12.4.2023. on *Q. cerris*.<br>Reference: Radonjić & Tomić, 1995; Milošević, 2003; Marković & Stojanović, 2011, 2015, 2019 |
| | Tribus Thamnurgini | |
| 80 | *Thamnurgus varipes* Eichhoff, 1878 | New finding: Belgrade, Lipovica Forest 23.7.1995. on *Euphorbia dendroides* L., Progar, Bojčin Forest 2.5.1995. on *Euphorbia* sp.; Pristina, Lipljan, Lipovica hunting area 9.5.1995. on *E. dendroides*.<br>Reference: Stevanović, 1998; Marković & Stojanović, 2000b |
| | Tribus Tomicini | |
| 81 | *Dendroctonus micans* (Kugelann, 1794) | Reference: Živojinović, 1961; Roganović, 2003 |
| 82 | *Hylurgus ligniperda* (Fabricius, 1787) | Reference: Živojinović & Živojinović, 1969; Stevanović, 1987; Marković & Stojanović, 2000b; Marković, 2013 |

| | Species | Reference/New finding |
|---|---|---|
| 83 | *Tomicus minor* (Hartig, 1834) | New finding: Belgrade, Stepin gaj 17.6.2005., 26.6.2006. on *P. nigra*; Kučevo, Majdan Kučajna 23.6.2005. on *P. nigra;* Mt. Avala 8.6.2005., 30.7.2005., 26.6.2006. on *P. nigra*; Mt. Bukovik 5.8.2015. on *P. nigra;* Mt. Goč: Brezna 23.6.2008. on *P. nigra*, Ravnine 20.7.2005. on *P. nigra*; Mt. Povlen: Smiljevo Polje 1.8.2005. on *P. nigra*, Vujinovača 1.8.2005., 16.9.2005. on *P. nigra*; Mt. Tara, Kaludjerske Bare 14.7.2006., 26.6.2008. on *P. nigra*; Raška, Zimovnik, Breze, Vilje kolo 16.4.1994. on *Pinus* sp.<br>Reference: Živojinović, 1954a, b, 1961; Živojinović & Živojinović, 1969; Stevanović, 1987; Adamović, 1990; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; Roganović, 2003; Marković, 2013 |
| 84 | *T. piniperda* (Linnaeus, 1758) | New finding: Mt. Avala 30.7.2005. on *P. nigra*.<br>Reference: Mamontov, 1937; Idrizović, 1947; Tunguz, 1951; Tomić, 1954; Živojinović, 1954a, 1961; Grujić, 1956; Maksimović & Milanović, 1964; Živojinović & Živojinović, 1969; Stevanović, 1987; Adamović, 1990; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; Marković, 2013 |
| 85 | *Xylechinus pilosus* (Ratzeburg, 1837) | Reference: Marković, 2013 |
| | Tribus Xyleborini | |
| 86 | Xyleborinus alni Niijima, 1909 | Reference: Marković & Stojanović, 2011; Marković, 2013 |
| 87 | *X. saxesenii* (Ratzeburg, 1837) | New finding: Belgrade: Bojčin Forest 22.4.1996 in flight, Košutnjak 9.3.1994., 4.3.1995., 6.3.1995., 19.3.1995. on *Carpinus betulus* L.<br>Reference: Živojinović, 1950a; Radonjić & Tomić, 1995; Marković & Stojanović, 2015 |
| 88 | *Xyleborus dispar* (Fabricius, 1792) | Reference: Langhoffer, 1915; Živojinović, 1950a; Maksimović, 1959, 1964; Karaman, 1971; Marković & Stojanović, 2011, 2015, 2019; Marković, 2013 |
| 89 | *X. cryptographus* (Ratzeburg, 1837) | Reference: Langhoffer, 1915; Živojinović et al, 1962 |
| 90 | *X. dryographus* (Ratzeburg, 1837) | New finding: Obrenovac, Draževac 2.8.1993. by Malaise trap.<br>Reference: Langhoffer, 1915; Mamontov, 1937; Živojinović, 1950a; Karaman, 1971; Marković & Stojanović, 2015 |
| 91 | *X. eurygraphus* (Ratzeburg, 1837) | Reference: Karaman, 1971; Marković, 2013 |
| 92 | *X. monographus* (Fabricius, 1792) | Reference: Živojinović, 1954a; Maksimović, 1959, 1964; Marković, 2013 |
| 93 | *X. pfeilii* (Ratzeburg, 1837) | Reference: Živojinović, 1950a |
| | Tribus Xyloterini | |
| 94 | *Trypodendron domesticus* (Linnaeus, 1758) | Reference: Mamontov, 1937; Tomić, 1954, 1957; Živojinović, 1954a; Marković, 2013 |
| 95 | *T. lineatum* (Olivier, 1795) | New finding: Mt. Kopaonik: Karaman 30.5.2001. on *P. abies*, Hajdučka voda 30.5.2001. on *P. abies*.<br>Reference: Živojinović, 1948, 1950b, 1954a, 1961; Janković, 1949; Tunguz, 1951; Tomić, 1954; Damnjanović, 1955; Maksimović & Barlov, 1961; Maksimović & Milanović, 1961; Stevanović, 1987; Adamović, 1990; Radonjić & Tomić, 1995; Marković & Stojanović, 2000a; Marković et al, 2004; Roganović, 2003; Marković, 2013 |
| 96 | *T. signatum (Fabricius, 1787)* | Reference: Karaman, 1971; Marković & Stojanović, 2015 |

* The tribes, genera and species in the table are listed according to Alonso-Zarazaga (2013)

## DISCUSSION

With around 150 species, Scolytinae do not represent a very large group of insects in Europe. As they are economically very important, they have been studied intensively in Serbia. In the list of species that Marković & Stojanović (1997a) made 25 years ago for Serbia, 85 species are listed. In this paper, 11 more species are mentioned. However, if these two lists are compared, it can be seen that the new list contains only 9 more species since two species from it were synonyms in the previous list. The species *C. cribellus* was listed in the previous list as a synonym of the species *C. pusillus* and the species *P. micrographus* as a synonym of the species *P. pityographus*. In the species list listed in this paper, these four species are separated.

Most of the species listed in this paper are widely distributed in Europe (Pfeffer, 1989). The findings of some species were not confirmed in the last 50 years or more in Serbia. In the case of species from the genus *Trypophloeus* Fairmaire, 1868, the reason for this is the difficulty in identification. They were found in several locations in Serbia, but due to that problem, their new findings are not listed in this paper. In the case of other species, the finding was not confirmed, probably because some of them are rare, some are less researched, and some may have been erroneously identified.

If the list of Scolytinae in Serbia is compared with similar lists that exist in other European countries (Nunberg, 1954; Pfeffer, 1989; Balaschowsky, 1949; Karaman, 1971; Mokrzycki et al, 2011), it is realistic to expect about 115 to 125 species of Scolytinae species in Serbia. Since 96 species have been found so far, more will certainly be found in the future. Most of the identified species were found in the area of western and central Serbia. The reason for this is that those areas are rich in coniferous forests, and most Scolytinae are associated with coniferous trees. The number of species found in other parts of Serbia is significantly lower. In Northern Serbia, a large number of species is not expected, since just a small percentage of its area is covered by forests. Eastern and southern Serbia is much more forested, so those parts of Serbia should be explored more in the future. The insect fauna of that part of Serbia is very rich (Živojinović, 1950a; Marković, 2022; Marković & Stojanović, 2019; Stojanović et al, 2018; Dobrosavljević et al, 2018a, 2018b) and as coniferous forests are present in some parts, new species of Scolytinae will most certainly be found there. It is likely that the invasive species *I. duplicatus* (Sahlberg, 1836), which is already present in neighboring Romania and Hungary (Wermelinger et al, 2020), will soon be found there, and throughout Serbia.

As an economically very important group of insects, Scolytinae are studied extensively on the Balkan Peninsula (Stanivuković & Vasiljević, 2018; Belilov et al, 2021; Milosavljević et al, 2021a, b, 2022; Georgieva et al, 2022). Unfortunately, the studies focused on their fauna in recent years are very few. Generally speaking, in this part of Europe, they have so far been investigated in detail only in Macedonia (Karaman, 1971). The list of species mentioned in this paper will help to complete the picture of their fauna on the Balkan Peninsula.

Taking into account all of the above, it can be concluded that with 96 species found so far, Serbia represents an area in which Scolytinae have not yet been sufficiently studied. To improve the knowledge of the Scolytinae fauna in the future, it is necessary to research the area of eastern and southern Serbia in more detail. Since the diversity of Scolytinae increases from the north to the south of Europe (Karaman, 1971), it is likely that at the time when these areas are researched, the total number of species in Serbia will be higher than the number of species identified in the countries of Central and Northern Europe (Nunberg, 1954; Pfeffer, 1989; Balaschowsky, 1949; Mokrzycki et al, 2011). This will show that the diversity of Scolytinae, as well as other xylophagous insects (Marković & Stojanović, 2011, 2012, 2019, 2020), is quite high in Serbia, even though it is a small country. The richness of its insect fauna can be seen in the research conducted by other authors (Živojinović, 1950; Petrović, 1998; Jerinić-Prodanović, 2010;

Ilić & Ćurčić, 2015; Dobrosavljević et al, 2017, 2023; Cebeci et al, 2018; Marković et al, 2018, 2021a, b; Jakšić, 2022).

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## REFERENCES

Adamović, M. (1990). Bark beetles (*Coleoptera*, *Scolytidae*) of silver fir (*Abies alba* Mill.) and black pine (*Pinus nigra* L.) on Goč mountain. Bachelor thesis, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Alonso-Zarazaga, M.A. (2013). Coleoptera, Curculionidae, Scolytinae. Fauna Europaea Web Service, Version 2.6.2. Retrieved from https://fauna-eu.org

Balachowsky, A. (1949). *The fauna of France 50, Coleoptera-Scolytidae*. Paul Lechevalier, Paris, France. (In French).

Belilov, S., Georgiev, G., Mirchev, P., & Georgieva, M. (2021). Three species of bark beetles (Coleoptera: Curculionidae, Scolytinae) on *Pinus peuce* in Pirin Mountains in Bulgaria. *Silva Balcanica*, 22(2), 69-72. doi: 10.3897/silvabalcanica.22.e73436

Cebeci, H., Marković, Č., Grabenweger, G., Ayberk, H., Dobrosavljević, J., Goltas, M., & Stojanović, A. (2018). Preliminary notes on pupal parasitism rates of the horse chesnut leafminer *Cameraria ohridella* (Lepidoptera: Gracillariidae) in Belgrade and Istanbul. *Fresenius Environmental Bulletin*, 27(10), 7122-7124.

Češljar, G., Bražanac-Bosanac, LJ., Đorđević, I., Eremija, S., Milosavljević, M., Jovanović, F., Rakonjac, LJ., & Simović, S. (2022). Unfavorable climatic factors and their impact on the decline of spruce at the Kopaonik national park (Central Serbia). *Fresenius Environmental Bulletin*, 31, 5204-5215.

Damnjanović, S. (1955). Experiments in controlling Ipidae by means of chemicals. *Plant Protection*, 31, 93-97. (In Serbian)

Dobrosavljević, J., Marković, Č., & Bojić, S. (2017). Overview of left miner fauna in Serbia. Proceedings of the 8th International Scientific Agriculture Symposium "Agrosym 2017". University of East Sarajevo, Faculty of Agriculture, East Sarajevo, *Bosnia and Herzegovina,* 1488-1498.

Dobrosavljević, J., Kanjevac, B., & Marković, Č. (2018a). Effects of *Andricus kollari* (Hartig, 1843) (Hymenoptera, Cynipidae) galls on the growth of sessile oak (*Quercus petraea* (Matt.) Liebl.). *Forestry*, 3-4, 137-151. (In Serbian)

Dobrosavljević, J., Marković, Č., & Stojanović, A. (2018b). Contribution to the knowledge of *Phyllonoricter issiki* (Kumata, 1963) (Lepidoptera, Gracillariidae) in Serbia. *Acta Entomologica Serbica*, 23(1), 25-32. doi: 10.5281/zenodo.1213045

Dobrosavljević, J., Marković, Č., & Marjanović, M. (2023). The effect of urban–rural gradient on black poplar endophagous herbivorous insects. *Arthropod-Plant Interactions*, 17, 341-350. doi: 10.1007/s11829-023-09963-y

Fernandez-Carillo, A., Patocka, Z., Dobrovolny, L., Franco-Nieto, A., & Revilla-Romero, B. (2020). Monitoring bark beetle forest damage in Central Europe. A remote sensing approach validated with field data. *Remote Sensing*, 12(21), 3634. doi: 10.3390/rs12213634

Georgieva, M., Belilov, S., Dimitrov, S., Iliev, M., Trenkin, V., Mirchev, P., & Georgiev, G. (2022). Application of Remote Sensing Data for Assessment of Bark Beetle Attacks in Pine Plantations in Kirkovo Region, the Eastern Rhodopes. *Forests*, 13, 620. doi: 10.3390/f13040620

Grégoire, JC., Raffa, KF., & Lindgren, BS. (2015). Economics and politics of bark beetles. In: Vega, FE., Hofstetter, RW. (Ed.). *Bark Beetles: Biology and Ecology of Native and Invasive Species* (pp. 585-613). Elsevier, London, United Kingdom. doi: 10.1016/B978-0-12-417156-5.00015-0

Grujić, D. (1956). Bark beetles of the surroundings of Kragujevac. Bachelor thesis, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Idrizović, S. (1947). Bark beetle outbreaks on Zlatar mountain during years 1946/47. Bachelor thesis, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Iku, A., Itioka, T., Kawakita, A., Goto, H., Ueda, A., Shimizu-kaya, U., & Meleng, P. (2018). High degree of polyphagy in a seed-eating bark beetle, *Coccotrypes gedeanus* (Coleoptera: Curculionidae: Scolytinae), during a community-wide fruiting event in a Bornean tropical rainforest. Tropics, 27(3), 59-66. doi: 10.3759/tropics.MS18-07

Ilić, N. & Ćurčić, S. (2015). A checklist of longhorn beetles (Coleoptera: Cerambycidae) of Serbia. *Zootaxa*, 4026(1), 1-97. doi: 10.11646/zootaxa.4026.1.1

Jakšić, P. (2022). *The First Catalogue of Moth and Butterfly Fauna of Serbia (Lepidoptera Linnaeus, 1758)*. Institute for Biological Research “Siniša Stanković”, National Institute of Republic of Serbia, University of Belgrade, Belgrade, Serbia.

Janković, LJ. (1949). *Ips curvidens* and *Ips vorontzowi* on Zlatar mountain in the year 1949. Bachelor thesis, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Janković, LJ. (1972). *The high-altitude fauna of Coleoptera of Mt. Kopaonik*. Serbian Academy of Sciences and Arts, Department of Natural-Mathematical Sciences, Special editions, 38, Belgrade, Serbia. (In Serbian)

Jerinić-Prodanović, D. (2010). Checklist of jumping plant-lice (Hemiptera: Psylloidea) in Serbia. *Acta Entomologica Serbica*, 15(1), 29-59.

Karaman, Z. (1971). *Fauna of Macedonia I, Bark Beetles-Scolytidae (Coleoptera-Insecta)*. Prosvetno delo, Skopje, *Macedonia*. (In Macedonian)

Kovačević, N. (1982). Contribution to the knoweledge of insects of burnt areas in forests of Deliblatski pesak. *Forestry*, 1, 33-42. (In Serbian)

Langhoffer, A. (1915). Scolytidae Croatiae (Scolytidae Croatiae). *Šumarski list*, 3-4, 53-75. (In Croatian)

Maksimović, M. (1959). Experiments in controlling Ipidae and Platypodidae in oak-log storages. *Plant Protection*, 51, 3-17. (In Serbian)

Maksimović, M. (1964). Test on action of new insecticides on Platypodidae and Xyleborinae and on *Cerambyx cerdo* L. *Forestry*, 3-4, 117-122. (In Serbian)

Maksimović, M. (1979). Influence of the density of bark beetles and their parasites on dieback of elm in some woods of Yugoslavia. *Journal of Applied Entomology*, 88(3), 283-295.

Maksimović, M. & Bošković, Ž. (1962). Trials of bark beetle control with Lindane agent. *Agrohemija*, 3, 170-175.

Maksimović, M. & Barlov, LJ. (1961). Protection of conifer forests against bark beetles by stacking or scattering the franches. *Plant Protection*, 63-64, 35-43. (In Serbian)

Maksimović, M. & Milanović, S. (1961). Protection of felled conifer trees and branch stacks against bark beetles by chemical means. *Agrohemija*, 9, 15-30. (In Serbian)

Maksimović, M. & Milanović, S. (1964). Preventive control of bark beetles (Scolytidae), longhorn beetles (Cerambicidae), and weevils (Curculionidae) with new domestic insecticides. *Agrohemija*, 5, 303-317.

Mamontov, B. (1937). Beetles of Avala mountain with special regards to harmful species. Bachelor thesis, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Manojlović, B. (1973). Smaller elm bark beetle *Scolytus multistriatus* Marsham. Master’s Dissertation, University of Belgrade, Faculty of Agriculture, Belgrade, Serbia. (In Serbian)

Manojlović, B. (1986a). Contribution to study of the *development* of the smaller elm *bark* beetle *Scolytus multistriatus* Marsh. (Coleoptera, Scolytidae). *Plant Protection*, 37(3), 251-270. (In Serbian)

Manojlović, B. (1986b). Contribution to the study of attack of elm by bark beetles with particular reference to the smaller elm bark beetle *Scolytus multistriatus* Marsh. (Coleoptera, Scolytidae). *Plant Protection*, 37(4), 297-310. (In Serbian)

Manojlović, B. (1998). Effect of *Ecphylus silesiacus* (Ratz.) (Hymenoptera: Braconidae) on parasitism of the elm bark beetle *Scolytus pygmaeus* (Fab.) (Coleoptera: Scolytidae) under laboratory conditions. *Contemporary Agricultural Engineering*, 5-6, 69-76. (In Serbian)

Manojlović, B. & Sivčev, I. (1995a). The influence of the diet of *Coeloides scolyticida* Wesm. (Hymenoptera: Braconidae) on parasiting on big elm bark beetle *Scolytus scolytus* (F.) (Coleoptera: Scolytidae). *Plant Protection*, 46(2), 155-162. (In Serbian)

Manojlović, B. & Sivčev, I. (1995b). The effect of elm bark thickness on *Scolytus scolytus* (F.) (Coleoptera: Scolytidae) growth in laboratory conditions. *Plant Protection*, 46(1), 35-42. (In Serbian)

Manojlović, B., Zabel, A., Stanković, S., & Kostić, M. (2000a). *Ecphylus silesiacus* (Ratz) (Hymenoptera, Braconidae), an important elm bark beetle parasitoid. *Agricultural and Forest Entomology*, 2, 63-67. doi: 10.1046/j.1461-9563.2000.00051.x

Manojlović, B., Zabel, A., Kostić, M., & Stanković, S. (2000b). Effect of nutrition of parasites with nectar of melliferous plants on parasitism of the elm bark beetles (Col., Scolytidae). *Journal of Applied Entomology*, 124(3-4), 155-161. doi: 10.1046/j.1439-0418.2000.00459.x

Manojlović, B., Zabel, A., Stanković, S., & Kostić, M. (2001). Additional diet of the parasitoids (Hymenoptera: Braconidae) and the parasitizing of the Elm Bark Beetle (Coleoptera: Scolytidae). *Journal of Pest Science*, 74(3), 66-71.

Manojlović, B., Zabel, A., Perić, P., Stanković, S., Rajković, S., & Kostić, M. (2003). *Dendrosoter protuberans* (Hymenoptera: Braconidae), an important elm bark beetle parasitoid. *Biocontrol Science and Technology*, 13(4), 429-439. doi: 10.1080/0958315031000124486

Marković, Č. (1995). Study of the European oak bark beetle *Scolytus intricatus* Ratz. (Coleoptera, Scolytidae) bioecology and its role in the process of oak forest decline in Serbia. Master's Dissertation, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Marković, Č. (1999). Biology of oak bark beetle *Scolytus intricatus* Ratz. (Coleoptera, Scolytidae) in Serbia and the possibilities of its control. Doctoral Dissertation, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Marković, Č. (2005). Oak Bark Beetle *Scolytus intricatus* Ratz. (Col., Scolytidae) in Serbia. Zadužbina Andrejević, Belgrade, Serbia. (In Serbian)

Marković, Č. (2011). Bark beetle vectors of Dutch elm disease. *Plant Doctor*, 6, 602-608. (In Serbian)

Marković, Č. (2012). Bark beetle *Ips typographus* (Linnaeus 1758) (Coleoptera: Scolytidae) outbreak on Kopaonik. *Plant Doctor,* 6, 522-527. (In Serbian)

Marković, Č. (2013). Collection of bark beetles (Curculionidae, Scolytinae) formed by Professor Dr. Svetislav Živojinović. *Acta Entomologica Serbica*, 18(1-2), 137-160.

Marković, Č. (2022). Survey of Cynipid Gall Wasps (Hymenoptera, Cynipidae) in Serbia. *Journal of the Entomological Research Society*, 24(2), 177-193.

Marković, Č. & Stojanović, A. (1996). Parasitoid complex *Scolytus intricatus* Ratz. (Coleoptera, Scolytidae) in the region of Serbia. *Plant Protection*, 47(3), 255-266. (In Serbian)

Marković, Č. & Stojanović, A. (1997a). A contribution to the study of bark beetle (Coleoptera, Scolytidae) fauna in Serbia. *Forestry*, 1, 40-51. (In Serbian)

Marković, Č. & Stojanović, A. (1997b). The first finding of the species *Scolytus levis* Chap. (Coleoptera, Scolytidae) in Yugoslavia. *Forestry*, 2, 33-36. (In Serbian)

Marković, Č. & Stojanović, A. (1997c). The first finding of *Phloeotribus caucasicus* Reitter (Coleoptera, Scolytidae) in Serbia. *Acta Entomolocica Serbica*, 2(1-2), 145-147.

Marković, Č. & Stojanović, A. (1999). The first finding of *Phloeophthorus brevicollis* Kolenati (Coleoptera, Scolytidae) in Yugoslavia. *Acta Entomologica Serbica*, 1-2, 145-147.

Marković, Č. & Stojanović, A. (2000a). A contribution to the study of bark beetle (Coleoptera, Scolytidae) fauna of the Mt. Goč. *Forestry*, 1, 17-23. (In Serbian)

Marković, Č. & Stojanović, A. (2000b). A new contribution to the study of the bark beetle fauna (Coleoptera, Scolytidae) of Mt. Kosmaj. *Forestry*, 2-3, 1-5. (In Serbian)

Marković, Č. & Stojanović, A. (2000c). The first finding of *Ernoporicus caucasicus* (Lindemann, 1876) (Coleoptera, Scolytidae) in Yugoslavia. *Acta Entomologica Serbica*, 5(1-2), 153-154.

Marković, Č. & Stojanović, A. (2001). Bionomics of *Scolytus intricatus* in Serbia. *Plant Protection*, 52(3), 183-197.

Marković, Č. & Stojanović, A. (2003). Significance of parasitoids in the reduction of oak bark beetle *Scolytus intricatus* Ratzeburg (Coleoptera: Scolytidae) in Serbia. *Journal of Applied Entomology*, 127(1), 23-28. doi: 10.1046/j.1439-0418.2003.00620.x

Marković, Č. & Stojanović, A. (2004). *Phloeosinus thujae* (Perris) and *Ph. aubei* (Perris) (Coleoptera, Scolytidae): Cause of shoot death in juniper, arborvitae and cypress. *Plant Doctor,* 5, 352-354. (In Serbian)

Marković, Č. & Stojanović, A. (2005). Oak bark beetle (*Scolytus intricatus*) vector of vascular fungi of genus *Ophiostoma*. *Plant Doctor,* 6, 632-636. (In Serbian)

Marković, Č. & Stojanović, A. (2010). Differences in bark beetle (*Ips typographus* and *Pityogenes chalcographus*) abundance in a strict spruce reserve and surrounding spruce forests of Serbia. *Phytoparasitica*, 38, 31-37. doi: 10.1007/s12600-009-0076-x

Marković, Č. & Stojanović, A. (2011). Phloemophagous and xylophagous insects, their parasitoids, predators and inquilines in the branches of the most important oak species in Serbia. *Biologia*, 66(3), 509-517. doi: 10.2478/s11756-011-0049-7

Marković, Č. & Stojanović, A. (2012). Fauna of phloemo-xylophagous insects, their parasitoids and predators on *Ulmus minor* in Serbia. *Biologia*, 67(3), 584-589. doi: 10.2478/s11756-012-0044-7

Marković, Č. & Stojanović, A. (2014). First finding of *Kissophagus vicinus* (Comolli, 1837) (Coleoptera: Curculionidae: Scolytinae) in Serbia. *Acta Entomologica Serbica*, 19(1-2), 77-78.

Marković, Č. & Stojanović, A. (2015). Contribution to the knowledge of the fauna of bark beetles (Coleoptera: Curculionidae: Scolytinae) on deciduous woody plants in Serbia. *Acta Entomologica Serbica*, 20, 43-51. doi: 10.5281/zenodo.45386

Marković, Č. & Stojanović, A. (2019). New data on the distribution of xylophagous insects of oak and their parasitoids and inquilines in Serbia. *Acta Entomologica Serbica*, 24(2), 43-56. doi: 10.5281/zenodo.3549691

Marković, Č. & Stojanović, A. (2020). New data on the distribution of phloemo-xylophagous insects of smooth-leaved elm (*Ulmus minor* Mill.) and their parasitoids and predators in Serbia. *Acta Entomologica Serbica*, 25(1), 55-65. doi: 10.5281/zenodo.3765876

Marković, Č., Dobrosavljević, J., Vujičić, P., & Cebeci, H.H. (2021a). Impact of regeneration by shelterwood cutting on the pedunculate oak (*Quercus robur*) leaf mining insect community. *Biologia*, 76, 1197-1203. doi: 10.2478/s11756-020-00631-7

Marković, Č., Dobrosavljević, J., & Milanović, S. (2021b). Factors Influencing the Oak Lace Bug (Hemiptera: Tingidae) Behavior on Oaks: Feeding Preference Does not Mean Better Performance? *Journal of Economic Entomology*, 114(5), 2051-2059. doi: 10.1093/jee/toab148

Marković, Č., Jančić, G., & Milanović, S. (2004). Bark beetle *Ips typographus* (L.), *Pityogenes chalcographus* (L.) and *Xyloterus lineatus* (Olivier) (Coleoptera, Scolytidae) outbreak on Mt. Stara Planina. *Plant Doctor,* 2, 144-149. (In Serbian)

Marković, Č., Stojanović, A., & Dobrosavljević, J. (2018). Diversity and abundance of coccinellids (Coleoptera: Coccinellidae) on trees in parks and tree rows of Belgrade. *Biologia*, 73(9), 857-865. doi: 10.2478/s11756-018-0087-5

Marković, Č., Stojanović, A., & Milenković, M. (1997). A contribution to the study of bark beetle *Scolytus pygmaeus* F., *S.kirschi* Skal. and *S.ensifer* Eich distribution and biology in Serbia. Proceedings of the

3rd international conference on the development of forestry and wood science/technology, volume II. Faculty of Forestry of Belgrade University, Belgrade, Serbia, 243-247.

Mihajlović, LJ., Marković, Č., Brajković, M., & Stojanović, A. (1994). Parasitic-predator complex of shot-hole borer *Scolytus rugulosus* Mull. (*Coleoptera*: *Scolytidae*). In: Plant protection today and tomorrow. *Plant Protection Society* of Serbia, Belgrade, Serbia, 383-394.

Milijašević, T., Knežević, M., Cvjetićanin, R., Marković, Č., & Stojanović, A. (1994). Virginian juniper (*Juniperus virginiana* L.) relation to edaphic conditions, plant diseases and pests in plantation at the Deliblato Sands. The Deliblato Sands-proceedings, 6, 529-538.

Milosavljević, M., Tabaković-Tošić, M., Pernek, M., Rakonjac, L., Lučić, A., Eremija, S., & Rindoš, M. (2022). Mites associated with the European spruce bark beetle *Ips typographus* (Linnaeus, 1758) in Europe, with new evidence for the fauna of Serbia. *Forests*, 13, 1586. doi: 10.3390/f13101586

Milosavljević, M., Tabaković-Tošić, M., Todorov, I., Mitroiu, M., & Georgiev, G. (2021a). New Records of Pteromalid Parasitoids (Hymenoptera: Pteromalidae) Reared from the Spruce Bark Beetle *Ips typographus* (L., 1758) from Serbia. *Acta Zoologica Bulgarica*, 73, 481-484.

Milosavljević, M., Tabaković-Tošić, M., Radulović, Z., Marković, M., & Rindoš, M. (2021b). Isolation, identification and phylogenetic position of entomopathogenic fungus *Beauveria bassiana* from *Ips typographus* in Serbia. *Fresenius Environmental Bulletin*, 30, 9443-9448.

Milošević, I. (2003). The Longhorn Beetles (Coleoptera, Cerambycidae) of Oak Forests in Serbia. Master's Dissertation, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Mokrzycki, T., Hilszczański, J., Borowski, J., Cieślak, R., Mazur, A., Miłkowski, M., Szołtys, H., Przewoźny, M., & Wełnicki, M. (2011) Faunistic review of Polish Platypodinae and Scolytinae (Coleoptera: Curculionidae). Polish Journal of Entomology, 80(2), 343-364.

Nunberg, M. (1954). *Keys for the Identification of Polish Insects, XIX, Coleoptera, 99-100, Scolytidae and Platypodidae.* Panstwowe Wydawnictwo Naukowe, Warsaw, Poland.

Ogrizek, E. (1955). Technical wood pests in Rogot. Bachelor thesis, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Petrović, O. (1998). Check-list of aphids (Homoptera: Aphididae) in Serbia. *Acta Entomologica Serbica*, 3(1-2), 9-42.

Pfeffer, A. (1989). *Scolytidae and Platypodidae*. Academia, Prague, Czech Republic. (in Czech)

Radonjć, S. & Tomić, D. (1995). A contribution to the study of bark beetle (Coleoptera, Scolytidae) in the forests of Kosmaj. *Forestry*, 3, 35-43. (In Serbian)

Radosavljević, M. (1938). My experiences on apple bark beetle. *Poljoprivredni glasnik*, 11, 5-7. (In Serbian)

Roganović, D. (2003). Contribution to the Knowledge of the Bark Beetles (Scolytidae, Coleoptera) on Spruce (*Picea excelsa* Link.) on Mt. Prokletije. *Nature Conservation*, 54, 115-122. (In Serbian)

Santini, A. & Faccoli, M. (2015). Dutch elm disease and elm bark beetles: a century of association. *iForest*, 8, 126-134. doi: 10.3832/ifor1231-008

Stanivuković, Z. & Vasiljević, R. (2018). Gradation of spruce bark beetles in the area of Han Pijesak. *Bulletin of the Faculty of Forestry, University of Banja Luka***,** 28, 29-36. (In Serbian)

Stark, V.N. (1952). *Bark beetels: Fauna of USSR XXXI*. Akademia Nauk SSSR, Moskva-Leningrad, Russia. (In Russian)

Stevanović, M. (1987). Bark beetles (Coleoptera, Scolytidae) of black pine (*Pinus nigra* Arn.) on Juhor mountain. Bachelor thesis, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Stevanović, M. (1998). Contribution to the chorology of *Thamnurgus varipes* Eichhoff (Coleoptera: Scolytidae) in East Serbia. *Acta Entomologica Serbica*, 3(1-2), 55-60.

Stojanović, A. & Marković, Č. (2001). Biodiversity and significance of the parasitoids *Scolytus rugulosus*. *Plant Protection*, 52(2), 115-122.

Stojanović, A. & Marković, Č. (2007). The hymenopteran parasitoids of some elm bark beetles in Serbia. *Phytoparasitica*, 35(3), 239-243. doi: 10.1007/BF02981156

Stojanović, A., Jovanović, M., & Marković, Č. (2018). Interesting species of the family Geometridae (Lepidoptera) recently collected in Serbia, including some that are new to the country's fauna. *Acta Entomologica Serbica*, 23(2), 27-41. doi: 10.5281/zenodo.2547675

Tabaković-Tošić, M. & Milosavljević, M. (2015). Impact of extreme weather conditions on the population dynamics of bark beetles in the forests of eastern Serbia. *Sustainable Forestry*, 71-72, 27-38.

Tabaković-Tošić, M. & Milosavljević, M. (2016). The correlation between the changes in climate, the intensity of spruce decline and the abundance of spruce bark beetles in "Golija" Nature park. *Sustainable Forestry*, 73-74, 59-68. doi: 10.5937/SustFor1673059T

Tabaković-Tošić, M. & Milosavljević, M. (2018). Comparative effectiveness of some insecticides in controlling *Ips typographus*. Proceedings of the 9th International Scientific Agriculture Symposium "Agrosym 2018". University of East Sarajevo, Faculty of Agriculture, East Sarajevo, *Bosnia and Herzegovina,* 2164-2169**.**

Tomić, D. (1954). Harmful insects of Zlatar mountain in 1952. *Bulletin of the Faculty of Forestry*, 7, 291-302. (In Serbian)

Tomić, D. (1957). Bark Beetles in the Biological Forest Reservation in Goliya Mountain in 1953. *Forestry*, 34, 207-210. (In Serbian)

Tomić, D., Žujović, K., Karadžić, D., Milijašević, T., & Glavendekić, M. (1992). The most important harmful insects and tree diseases in New Belgrade. *Bulletin of the Faculty of Forestry*, 74, 53-62. (In Serbian)

Tunguz, V. (1951). Bark beetle fauna of Avala mountain. Bachelor thesis, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Vasić, M. (1982). Application of pheromone for the control of the spruce bark beetle (*Ips typographus* L.). *Forestry*, 1, 43-50. (In Serbian)

Vasić, M., Josović, J., Miletić, M., Bukumira, M., & Mitrović, V. (1982). Aplication of feromone for the control of the spruce's bark beetle (*Ips typographus* L.). *Forestry*, 1, 43-50. (In Serbian)

Vrkić, M. (1989). Harmful insects on trees and shrubs in a park in Svetozarevo. Bachelor thesis, University of Belgrade, Faculty of Forestry, Belgrade, Serbia. (In Serbian)

Vujić, M., & Vesović, N. (2022). The fig bark beetle *Hypoborus ficus* Erichson, 1836 (Coleoptera: Curculionidae: Scolytinae) in Serbia: First records for more than a century. *Acta Entomologica Serbica*, 27(2), 91-96. doi: 10.5281/zenodo.7447652

Wermelinger, B., Schneider Mathis, D., Knížek, M., & Forster, B. (2020). Tracking the spread of the northern bark beetle (*Ips duplicatus* [Sahlb.]) in Europe and first records from Switzerland and Liechtenstein. *Alpine Entomology*, 4, 179-184. doi: 10.3897/alpento.4.53808

Wood, S. L. (2007). *Bark and ambrosia beetles of South America (Coleoptera: Scolytidae)*. Monte L. Bean Life Science Museum, Brigham Young University, Provo, Utah, USA.

Živojinović, D. (1963). Contribution to the knowledge of forest entomofauna in Deliblato Sands. *Plant Protection*, 74, 437-462. (In Serbian)

Živojinović, S. (1948). Bark beetle outbreaks of in coniferous forests of Serbia in years 1945/47. *Godišnjak Poljoprivredno-Šumarskog fakulteta u Beogradu*, 1, 65-73. (In Serbian)

Živojinović, S. (1950a). *Insect Fauna of Domena Majdanpek*. Serbian Academy of Sciences and Arts, Institute for Ecology and Biogeography, Special editions, 160, 2, Belgrade, Serbia. (In Serbian)

Živojinović, S. (1950b). Scolytidae of Mt. Golija. *Bulletin of the Faculty of Forestry*, 1, 299-310. (In Serbian)

Živojinović, S. (1954a). A Contribution to the Knowledge of Scolytidae on the Maljen Mountain. *Bulletin of the Faculty of Forestry*, 8, 3-29. (In Serbian)

Živojinović, S. (1954b). *Diprion pini* L.: History of the gradation and consequences of the defoliation is caused on the Maljen. *Plant Protection*, 24, 3-19. (In Serbian)

Živojinović, S. (1960). A Contribution to the Knowledge of Scolytidae living on *Pinus heldreichi* Christ. and *Pinus peuce* Griesbach in Serbia. *Plant Protection*, 57-58, 20-29. (In Serbian)

Živojinović, S. (1961). A Contribution to the Study of Scolytidae of Mt. Prokletije (PR Serbia). *Glasnik muzeja šumarstva i lovstva*, 1, 69-100. (In Serbian)

Živojinović, S. & Petrović, M. (1955). Injurious forest insects in the parks of Belgrade. *Forestry*, 5, 248-257. (In Serbian)

Živojinović, S., Vasić, K., & Tomić, D. (1962). A second contribution to the knowledge of insects harmful to the softwood broadleaved trees in Yugoslavia. *Bulletin of the Faculty of Forestry*, 26, 25-64. (In Serbian)

Živojinović, S. & Živojinović, D. (1969). Contribution to the knowledge of bark beetles (Scolytidae) of Deliblato sands. The Deliblato Sands-proceedings, 1, 185-198. (In Serbian)