This text is an integral part of the *EPPO Study on bark and ambrosia beetles associated with imported non-coniferous wood* and should be read in conjunction with the study

Pest information sheet
Ambrosia beetle

AMBROSIODMUS RUBRICOLLIS (COLEOPTERA: SCOLYTINAE)

EPPO Lists: Not listed. The assessment of potential risks in this information sheet is not based on a full PRA for the EPPO region, but on an assessment of the limited information for that species used to prepare the information sheet.

PEST OVERVIEW

Taxonomy
Ambrosiodmus rubricollis (Eichhoff 1875); Synonyms: *Xyleborus rubricollis* Eichhoff 1875; *Xyleborus taboensis* Schedl 1952; *Xyleborus strohmeyeri* Schedl 1975.

Associated fungi
Flavodon ambrosius was identified as the mutualist fungus of several *Ambrosiodmus* and *Ambrosiophilus* spp. around the world, including *A. rubricollis*. It is the only known ambrosial basidiomycete. *F. ambrosius* is a true wood-degrading saprophyte (not pathogenic), which explain why *A. rubricollis* can attack dead wood (see below) (Li *et al.*, 2015, 2017).

Morphology and biology
Adults measure ca. 1.6-2.7 mm (Bright, 1968). Rassati *et al.* (2016) note that the biology and ecology of *A. rubricollis* have not been deeply investigated yet. *Ambrosiodmius* species inbreed, i.e. females mate with siblings before emerging from the host (Faccoli *et al.*, 2009). *A. rubricollis* develops mainly in dead and decayed wood (Faccoli *et al.*, 2009; Li *et al.*, 2015). *Ambrosiodmus* species appear to be able to colonize wood throughout the process of its decay, including later stages when xylem is co-colonized by competitive wood-rot fungi (Li *et al.*, 2015). It has been found infesting dead saplings and cut poles of 2-15 cm diameter (Browne, 1961).

A. rubricollis has also been recorded on live plants. Kovach and Gorsuch (1985) reported attacks on trunks of peach trees of ca. 15 cm diameter, with some entrance holes found 10 cm below the soil line; no known stress factor could be associated with the infested trees. *A. rubricollis* was also recovered from artificially flood-stressed potted *Cornus florida* in Ohio of ca. 2 cm diameter (Ranger, 2015). In Italy, it has been recorded in the sapwood of living stressed trees infected by *Armillaria mellea* (honey fungus): *Aesculus hippocastanum* and *Prunus persica* (see details below; Faccoli *et al.*, 2009).

Spread biology
No details were found.

Nature of the damage
A. rubricollis tunnels in the sapwood. No details were found on damage to the trees. The only known associated fungus to date is a saprophyte (see *Associated fungi*).

Detection and identification
- *Symptoms.* No specific information on symptoms was found in the literature, but they are probably similar to other ambrosia beetles.
- *Trapping*. It was collected in traps baited with exotic *Ips* lure, ethanol lure, and ethanol + α-pinene lure in Ohio and Georgia (Ghandi *et al.*, 2010; Sheehan *et al.* 2018). In Italy, it was collected in a pheromone trap baited with ipsdienol and ipsenol (Faccoli *et al.*, 2009).

- *Identification*. In Europe, *A. rubricollis* is the only *Ambrosiodmus* species known, and is easily distinguished from other European species of the tribe Xyleborini (characters indicated in Faccoli *et al.*, 2009). A key to some *Ambrosiodmus* spp. is available in Gomez *et al.* (2018 – for North America). Sequences of *A. rubricollis* are available in GenBank (Cognato *et al.*, 2011).

Distribution (see Table 1)
A rubricollis is endemic to Asia. In the USA, it was first found in Maryland in 1942 (Bright, 1968), and has since spread throughout the Southeast, then East and into the Midwest (Rabaglia *et al.* 2006, Lightle *et al.* 2007), reaching Michigan in the North (Cognato *et al.*, 2009). Reed and Muzika (2010) reported findings during surveys in forest stands in Missouri, and noted that it had previously been collected only in urban and industrial areas of the Midwest. In Australia, *A. rubricollis* is also recorded as introduced (Wood & Bright 1992), but no details were found.

In the EPPO region, *A. rubricollis* is present in Italy and Slovenia. In Italy, it was first recorded in the Veneto region in 2009, first on a live *Aesculus hippocastanum* tree in the botanical garden of Padova, then in about 80 peach trees in an orchard in Alpo di Villafranca, Verona, while one individual was trapped at the international harbour of Venice (Faccoli *et al.*, 2009). Infested trees were stressed and colonized by the honey fungus *Armillaria mellea*. *A. rubricollis* was considered established (three different localities separated by more than 100 km, large number of overwintering and breeding adults found, infested *A. hippocastanum* hosting overwintering adults) (Faccoli *et al.*, 2009; Kirkendall and Faccoli, 2010; M. Faccoli, pers. comm.). *A. rubricollis* was later trapped in the neighbouring region of Friuli Venezia-Giulia, in Campania in 2013 (no details provided), as well as in a nursery in Toscana in 2010 (Inghilesi, 2012 abstract; Inghilesi *et al.*, 2013). In Slovenia, one specimen of *A. rubricollis* was trapped in March 2018 in a forest in Tolmin municipality (Western Slovenia), and it is considered present (NPPO of Slovenia, 2018).

Host plants (see Table 2)
A. rubricollis is 'extremely polyphagous on broadleaved trees and shrubs, and is occasionally reported also from conifers' (Faccoli *et al.*, 2009, citing others). Common host species include *Carya* spp., *Cornus* spp., *Prunus* spp., and *Quercus* spp. (Lightle *et al.*, 2007 citing Wood, 1982). *A. hippocastanum* in Italy was a new host (Faccoli *et al.*, 2009). A list of over 40 hosts in 21 families is included in Table 2.

Known impacts and control in current distribution
A. rubricollis is not considered an aggressive species because it develops mainly in dead wood, but it is an invasive species with a high expansion rate (Faccoli *et al.*, 2009). Nevertheless, in the USA, Wood (1977) noted that *A. rubricollis* may be of local economic concern. Very few reports of attacks on live plants in the USA were found, but one related to healthy peach trees (Kovach and Gorsuch, 1985). White (1987) refers to very few reported cases of Scolytinae pests infesting peach tree orchards and notes that *A. rubricollis* is not considered a pest. Based on information obtained from USDA-Aphis (letter on pests of US peaches, nectarines and plums), Biosecurity Australia (2010) considered *A. rubricollis* associated with production of plum, nectarine and (or) peach.

In Italy, *A. rubricollis* was found attacking stressed trees (see *Distribution*). Faccoli *et al.* (2009) stated that the strong infestation observed in a peach orchard in 2008 could be a first indicator of the potential harmfulness of the species in a new continent, although the trees were in poor conditions. It is not clear if damage was observed in the nursery where it was later trapped in Toscana, nor in Friuli Venezia-Giulia.

Finally, no data was found on the situation and impact in Australia (where *A. rubricollis* is recorded as introduced) nor in Asia.

Control: No mention of control was found.

POTENTIAL RISKS FOR THE EPPO REGION

Pathways

Entry

A. rubricollis is considered more likely to have been introduced into Italy on dead wood or wood packaging material than on living plants (Faccoli *et al.*, 2009). Life stages are associated with the xylem. *A. rubricollis* may be associated with wood commodities and, as it attacks mainly dead and decayed wood, may be less affected by the degradation and decreased humidity in the wood. Processes applied to produce wood commodities would destroy some individuals. The likelihood of entry on wood chips, hogwood and processing wood residues would be lower than on round wood, as individuals would have to survive processing and transport, and transfer to a suitable host is less likely. Bark on its own is an unlikely pathway.

A. rubricollis has been only occasionally been recorded on live plants, and there is limited information on its association with nursery plants (finding in a nursery in Toscana, Italy, and attracted by flood-stressed *Cornus florida* potted trees of ca. 2 cm diameter in Ohio). Plants for planting may be a pathway, although they are subject to a degree of control during production, during which attacked plants may be detected and discarded. Entry on cut branches is less likely than plants for planting, as they are also normally used indoors and the pest is unlikely to be able to transfer to a suitable host.

Finally, *A. rubricollis* is an inbreeder, a trait favourable to entry and establishment.

Summary of pathways (uncertain pathways are marked with '?'):

- *wood (round or sawn, with or without bark, incl. firewood) of hosts*
- *wood chips, hogwood, processing wood residues (except sawdust and shavings)*
- *wood packaging material if not treated according to ISPM 15*
- *plants for planting (except seeds) of hosts?*
- *cut branches of hosts (incl. Christmas trees)?*

Because of the large and uncertain host range, pathways may cover all non-coniferous species, and possibly also all coniferous species (including Christmas trees).

Spread (following introduction, i.e. within EPPO region)

A. rubricollis could spread naturally and through human-assisted pathways. Human-assisted pathways may lead to multiple introductions from which local spread could occur. In the USA, *A. rubricollis* is reported to have spread (Rabaglia *et al.* 2006, Lightle *et al.* 2007). Some spread may have occurred in Italy where it was found in several places in Veneto and in the neighbouring region of Friuli Venezia Giulia, as well as in a nursery in Toscana. Natural spread is considered the most likely origin of the specimen trapped in Slovenia (NPPO of Slovenia, 2018). Spread from Italy to Switzerland is less likely due to the obstacle of the Alps, as well as to France because the outbreaks are still far from the border.

Establishment

A. rubricollis is native to tropical Asia (Rassati *et al.* 2014). It has established in a wide range of climates in the USA and in Italy. It was able to survive winter in the North of Italy (Veneto). Based on the classification of Köppen-Geiger (see Annex 6 of the study), the climate type Cfa[1] is present in a large part of the distribution of *A. rubricollis* in the USA, as well as in part of the EPPO region, such as the Black Sea, Northern Italy and part of the Balkans. The few records from Italy suggest that it may be able to establish in more temperate and Mediterranean climates.

Regarding hosts, *A. rubricollis* has a wide host range comprising many genera that are widespread in the EPPO region in the wild or in cultivation (e.g. *Alnus*, *Prunus*, *Salix*, *Quercus*). The host range comprises species that are widespread mostly in the southern part of the EPPO region (such as *Prunus persica* and *P. armeniaca*), and as ornamentals in gardens or in protected cultivation elsewhere. Its large host range and the findings on new hosts, such as *Aesculus hippocastanum*, suggest that it will be able to attack other plant species, including dead and decayed wood, provided it finds suitable conditions for its development.

Areas with suitable climates and host plants are available in the EPPO region, where establishment is possible.

[1] **Cfa**: warm temperate climate, fully humid, hot summer.

Potential impact (including consideration of host plants)
Although *A. rubricollis* may be able to attack and breed on many species, the main record of concern in the literature relates to peach trees both in Italy and the USA. It may be able to maintain populations in many different habitats, including both wild and cultivated habitats. Its significance for young plants (in nurseries) is not known.

Table 1. Distribution

Distribution	Reference	Comments
EPPO region		
Italy	Faccoli *et al.*, 2009	Introduced. First record in Veneto (Faccoli *et al.*, 2009), then Friuli Venezia Giulia and Toscana (for both no details - see *Distribution*).
Asia		
China - Anhui, Fujian, Hebei, Hunan, Shandong, Shanxi, Sichuan, Xizang (Tibet) - Heilongjiang, Guizhou, Yunnan	- Atkinson, 2018 citing Wood and Bright, 1992 - Bright, 2014	
India (Assam)	Atkinson, 2018, citing Wood and Bright, 1992	
Japan	Beaver and Browne, 1978	
Korea Rep.	Choo *et al.*, 1983	
Malaysia	Beaver and Browne, 1978	
Taiwan	Beaver and Browne, 1978	
Thailand	Atkinson, 2018, citing Wood and Bright, 1992	
Vietnam	Atkinson, 2018, citing Wood and Bright, 1992	
North America		
Mexico	Atkinson, 2018 citing Wood 2007	Introduced

USA: - Maryland - Alabama, Connecticut, Delaware, Florida, Louisiana, Maryland, Mississippi, Pennsylvania, South Carolina, Tennessee, Virginia - Ohio - Michigan - Georgia - Missouri - North Carolina, Pennsylvania - Illinois - Indiana - Texas - Arkansas, Oklahoma *Uncertain records*: Kansas, Kentucky, Nebraska, New Jersey, New York, North Carolina, Rhode Island, West Virginia	- Bright, 1968 - Rabaglia *et al.*, 2006 - Lightle *et al.*, 2007 (first record) - Cognato *et al.*, 2009 - Miller and Rabaglia, 2009 - Reed and Muzika, 2010 - Bright 2014 -Helm and Molano-Flores, 2015 - Atkinson, 2018 citing Deyrup, 1981 - Atkinson and Riley, 2013 - Gomez *et al*., 2018, citing others -Atkinson, 2018	Introduced. Haack and Rabaglia (2013) mention 21 states, and there are more in Atkinson (2018) possibly indicating further spread. Considered uncertain here because unpublished
Oceania		
Australia	Atkinson, 2018 citing Wood and Bright, 1992	Introduced. No details found.

Table 2. Hosts (some references below refer to other publications)

Family	**Genus/Species**	**Reference**
Anacardiaceae	*Rhus*	Atkinson, 2018
Aquifoliaceae	*Ilex*	Atkinson, 2018
Betulaceae	*Alnus sibirica*	Faccoli *et al.*, 2009
Combretaceae	*Terminalia myriocarpa*	Atkinson, 2018
Cornaceae	*Cornus*	Atkinson, 2018

Family	**Genus/Species**	**Reference**
Cornaceae	*Cornus florida*	Ranger *et al.*, 2015
Cupressaceae	*Cunninghamia lanceolata*	Faccoli *et al.*, 2009
Cupressaceae	*Cuprocyparis leylandii (as Cupressocyparis)*	Atkinson, 2018
Cupressaceae	*Platycladus orientalis* (as *Biota*)	Faccoli *et al.*, 2009
Ebenaceae	*Diospyros kaki*	Choo *et al.*, 1983
Fabaceae	*Cercis chinensis*	Choo *et al.*, 1983
Fabaceae	*Sophora japonica*	Faccoli *et al.*, 2009
Fabaceae	*Acacia*	Atkinson, 2018
Fabaceae	*Hovea*	Atkinson, 2018
Fagaceae	*Castanea*	Atkinson, 2018
Fagaceae	*Castanea crenata*	Choo *et al.*, 1983
Fagaceae	*Quercus*	Atkinson, 2018
Fagaceae	*Quercus serrata*	Sanguansub *et al.*, 2012
Juglandaceae	*Carya*	Faccoli *et al.*, 2009
Juglandaceae	*Carya glabrata*	Faccoli *et al.*, 2009
Juglandaceae	*Carya illinoensis*	Atkinson, 2018
Juglandaceae	*Carya ovata*	Atkinson, 2018
Juglandaceae	*Juglans nigra*	Atkinson, 2018
Lamiaceae	*Vitex negundo*	Faccoli *et al.*, 2009
Lauraceae	*Cinnamomum*	Faccoli *et al.*, 2009
Lauraceae	*Machilus*	Atkinson, 2018
Moraceae	*Morus*	Atkinson, 2018
Moraceae	*Morus alba*	Faccoli *et al.*, 2009
Myricaceae	*Myrica*	Atkinson, 2018
Oleaceae	*Fraxinus chinensis*	Faccoli *et al.*, 2009
Oleaceae	*Ligustrum*	Atkinson, 2018
Oleaceae	*Ligustrum lucidum*	Faccoli *et al.*, 2009

Family	Genus/Species	Reference
Pinaceae	*Abies fabri*	Faccoli *et al.*, 2009
Pinaceae	*Pinus merkusii*	Faccoli *et al.*, 2009
Rosaceae	*Prunus*	Faccoli *et al.*, 2009
Rosaceae	*Prunus armeniaca*	Choo *et al.*, 1983
Rosaceae	*Prunus persica*	Atkinson, 2018
Rubiaceae	*Gardenia angusta*	Atkinson, 2018
Salicaceae	*Populus*	Faccoli *et al.*, 2009
Salicaceae	*Salix*	Atkinson, 2018
Sapindaceae	*Aesculus hippocastanum*	Faccoli *et al.*, 2009
Theaceae	*Schima superba*	Faccoli *et al.*, 2009
Ulmaceae	*Ulmus americana*	Atkinson, 2018

References (all URLs were accessed in January 2018)

Atkinson TH. 2018. Bark and Ambrosia Beetles. Online database. http://www.barkbeetles.info/index.php

Atkinson TH, Riley EG. 2013. Atlas and Checklist of the bark and ambrosia beetles of Texas and Oklahoma (Curculionidae: Scolytinae and Platypodinae). Insecta Mundi 292: 1-46.

Beaver RA, Browne FG. 1978.The Scolytidae and Platypodidae (Coleoptera) of Penang, Malaysia. Oriental Insects 12 (4).

Biosecurity Australia. 2010. Provisional final import risk analysis report for fresh stone fruit from California, Idaho, Oregon and Washington. Biosecurity Australia, Canberra. http://www.agriculture.gov.au/SiteCollectionDocuments/ba/plant/2011/Provisional_Final_IRA_Report_-_US_Stone_fruit.pdf

Bright DE. 1968. Review of the tribe Xyleborini in America north of Mexico (Coleoptera: Scolytidae). Can. Entomol. 100: 1288-1323.

Bright DE. 2014. A Catalog of Scolytidae and Platypodidae (Coleoptera), Supplement 3 (2000-2010), with notes on subfamily and tribal reclassifications". Insecta Mundi. 861. http://digitalcommons.unl.edu/insectamundi/861

Browne FG. 1961. The biology of Malayan Scolytidae and Platypodidae. Malayan Forest Records 22: 1-255.

Choo HY, Woo KS, Nobuchi A. 1983. A list of the bark and ambrosia beetles injurious to fruit and flowering trees from Korea (Coleoptera: Scolytidae). Korean Journal of Plant Protection, 22(3):171-173

Cognato AI, Barc N, Philip M, Mech R, Smith AD, Galbraith E, Storer AJ, Kirkendall LR. 2009. The native and introduced bark and ambrosia beetles of Michigan (Coleoptera: Curculionidae, Scolytinae). The Great Lakes Entomologist, Vol. 42, Nos. 3 & 4, 101-120.

Cognato AI, Hulcr J, Dole SA, Jordal BH. 2011. Phylogeny of haplo–diploid, fungus-growing ambrosia beetles (Curculionidae: Scolytinae: Xyleborini) inferred from molecular and morphological data. Zoologica Scripta a 2011 The Norwegian Academy of Science and Letters, 40, 2, March 2011, pp174–186.

Faccoli M, Frigimelica G, Mori N, Toffolo EP, Vettorazzo M, Simonato M. 2009. First record of *Ambrosiodmus* (Hopkins, 1915) (Coleoptera: Curculionidae, Scolytinae) in Europe. Zootaxa 2303: 57–60.

Gandhi KJ, Cognato AI, Lightle DM, Mosley BJ, Nielsen DG, Herms DA. 2010. Species composition, seasonal activity, and semiochemical response of native and exotic bark and ambrosia beetles (Coleoptera: Curculionidae: Scolytinae) in northeastern Ohio. J Econ Entomol. 103(4):1187-1195.

Gomez DF, Rabaglia RJ, Fairbanks KE, Hulcr J. 2018. North American Xyleborini north of Mexico: a review and key to genera and species (Coleoptera, Curculionidae, Scolytinae). ZooKeys, 768, 19.

Haack RA, Rabaglia RJ. 2013. Exotic bark and ambrosia beetles in the USA: potential and current invaders. Potential invasive pests of agricultural crops. CAB International, Wallingford, 48-74.

Helm C, Molano-Flores B. 2015. New Records of Native and Non-Native Bark and Ambrosia Beetles (Coleoptera: Curculionidae: Scolytinae) in Illinois. Great Lakes Entomol. 48(3-4):137-149.

Inghilesi AF, Anselmi M, Gherardi F, Mazza G, Pennacchio F, Stasolla G, Cervo R. 2013. Poster. Bio- and allodiversity of Scolytidae and non-target arthropods in nurseries. 73° Congresso Dell'unione Zoologica Italiana Firenze 24 -27 Settembre 2012 Riassunti Dei Contributi a cura di E. Baistrocchi, M. Zaccaroni. Firenze University Press.

Inghilesi AF. 2012. Management of the Invasions of Allochthonous Arthropods: Pathways of Introduction and Eto-ecological Aspects: Tesi. Università degli studi di Firenze. Dipartimento di biologia evoluzionistica Leo Pardi.

Kirkendall LR, Faccoli M. 2010. Bark beetles and pinhole borers (Curculionidae, Scolytinae, Platypodinae) alien to Europe. ZooKeys 56: 227–251.

Kovach J, Gorsuch CS. 1985. Survey Of Ambrosia Beetle Species' Infesting South Carolina Peach Orchards And A Taxonomic Key For The Most Common Species'". J. Agric. Entomol. 2(3): 238-247.

Li Y, Bateman CC, Skelton J, Jusino MA, Nolen ZJ, Simmons DR, Hulcr J. 2017. Wood decay fungus *Flavodon ambrosius* (Basidiomycota: Polyporales) is widely farmed by two genera of ambrosia beetles. Fungal Biol. 121(11):984-989.

Li Y, Simmons DR, Bateman CC, Short DP, Kasson MT, Rabaglia RJ, Hulcr J. 2015. New Fungus-Insect Symbiosis: Culturing, Molecular, and Histological Methods Determine Saprophytic Polyporales Mutualists of *Ambrosiodmus* Ambrosia Beetles. PLoS One. 14;10(9):e0137689.

Lightle DM, Gandhi KJK, Cognato AI, Mosley BJ, Nielsen DG, Herms DA. 2007. New reports of exotic and native ambrosia and bark beetle species (Coleoptera: Curculionidae: Scolytinae) from Ohio. The Great Lakes Entomologist Vol. 40 (3 & 4), 10.

Miller DR, Rabaglia RJ. 2009. Ethanol and (−)-α-Pinene: Attractant Kairomones for Bark and Ambrosia Beetles in the Southeastern US. Journal of Chemical Ecology, 35(4), 435-448.

NPPO of Slovenia. 2018. First confirmed presence of *Ambrosiodmus rubricollis* (Eichhoff, 1875) in the territory of Slovenia. Pest Report.

Rabaglia RJ, Dole SA, Cognato AI. 2006. Review of American Xyleborina (Coleoptera: Curculionidae: Scolytinae) occurring north of Mexico, with an illustrated key. Annals of the Entomological Society of America, 99, 1034-1056.

Ranger CM, Schultz PB, Frank SD, Chong JH, Reding ME. 2015. Non-Native Ambrosia Beetles as Opportunistic Exploiters of Living but Weakened Trees. PLoS ONE 10(7): e0131496. doi:10.1371/ journal.pone.0131496.

Rassati D, Leutier F, Faccoli M. 2016. Alien wood-boring beetles in Mediterranean regions. Chapter 11 in Insects and Diseases of Mediterranean Forest Systems. Paine TD, Lieutier F. (eds), Springer, 892 pages.

Rassati D, Toffolo EP, Roques A, Battisti A, Faccoli M. 2014. Trapping wood boring beetles in Italian ports: a pilot study. J Pest Sci 87:61–69.

Reed SE, Muzika RM. 2010. The influence of forest stand and site characteristics on the composition of exotic dominated ambrosia beetle communities (Coleoptera: Curculionidae: Scolytinae). Environ Entomol. 39(5):1482-1491.

Regione Campania. 2013. UOD Fitosanitario Regionale. Piano d'azione URCOFUI. Giunta Regionale della Campania, Direzione Generale per le Politiche Agricole, Alimentari e Forestali, Dipartimento della Salute e delle Risorse Naturali. from http://burc.regione.campania.it

Sanguansub S, Goto H, Kamata N. 2012. Guild structure of ambrosia beetles attacking a deciduous oak tree *Quercus serrata* in relation to wood oldness and seasonality in three locations in the Central Japan. Entomological Science 15, 42–55.

Sheehan TN, Ulyshen MD, Horn S, Hoebeke ER. 2018. Vertical and horizontal distribution of bark and woodboring beetles by feeding guild: is there an optimal trap location for detection? Journal of Pest Science, 1-15.

Takagi K. 1967. The Storage Organ of Symbiotic Fungus in the Ambrosia Beetle *Xyleborus rubricollis* Eichhoff: Coleoptera: Scolytidae. Applied entomology and zoology. vol. 2(3), 168-170.

White KJ. 1987. Scolytid pest of stone fruit orchards. MSc thesis, University of Victoria.

Wood SL. 1977. Introduced and exported American Scolytidae (Coleoptera). Great Basin Naturalist: Vol. 37: No. 1, Article 5, 67-74. Available at: http://scholarsarchive.byu.edu/gbn/vol37/iss1/5

Wood SL, Bright DE. 1992. A catalog of Scolytidae and Platypodidae (Coleoptera), Part 2. Taxonomic Index. Great Basin Nat. Mem. 13:1-1553 (vol. A, B).

How to cite this document

EPPO (2020) Pest information sheet on *Ambrosiodmus rubricollis*. In: EPPO Study on the risk of bark and ambrosia beetles associated with imported non-coniferous wood. EPPO Technical Document no. 1081, pp 44-49. https://www.eppo.int/media/uploaded_images/RESOURCES/eppo_publications/TD-1081_EPPO_Study_bark_ambrosia.pdf