First records of the banded elm bark beetle, *Scolytus schevyrewi* Semenov (Coleoptera: Curculionidae: Scolytinae), in British Columbia

L.M. HUMBLE[1], E. JOHN[1], J. SMITH[2], G.M.G. ZILAHI-BALOGH[3], T. KIMOTO[4] and M. K. NOSEWORTHY[1]

ABSTRACT

The banded elm bark beetle, *Scolytus schevyrewi* Semenov was detected for the first time in British Columbia near Kelowna during 2010. Fifty-eight *S. schevyrewi* were captured in an experiment that targeted the European elm bark beetle, *Scolytus multistriatus* (Marsham). It was a test of the efficacy of a new trap design relative to the multiple funnel trap currently used in surveillance programs for invasive bark- and wood-boring Coleoptera. Data on the seasonal occurrence of the banded elm bark beetle are presented.

Key Words: banded elm bark beetle, *Scolytus schevyrewi*, forest pest, invasive species

INTRODUCTION

The banded elm bark beetle, *Scolytus schevyrewi* Semenov (Coleoptera: Curculionidae: Scolytinae), is an invasive bark beetle native to central and eastern Asia (Negrón et al. 2005; CABI/EPPO 2009; Lee et al. 2009). It was first reported from North America in Colorado and Utah in 2003 (Negrón et al. 2005) and was soon found to be more widely distributed (Negrón et al. 2005). In the U.S.A., *S. schevyrewi* is now reported from 28 states including all states west of the Mississippi River (except Arkansas, Iowa, Louisiana and North Dakota) as well as from Connecticut, Delaware, Illinois, Indiana, Maryland, Michigan, Minnestoa, Missouri, New Jersey, Ohio, Pennsylvania and Virginia, (Lee et al. 2009; NAPIS 2010). Specimens in reference collections indicate that *S. schevyrewi* was present in the U.S.A. (Colorado) as early as 1994 (Lee et al. 2009). In Canada, banded elm bark beetle was first detected in Alberta in 2006 (Langor et al. 2009) and has subsequently been reported from locations in Saskatchewan, Manitoba and Ontario (CABI/EPPO 2009). While species of elms (*Ulmus*) are the only reported hosts for *S. schevyrewi* in North America and are its primary hosts in Asia, it has also been recorded to attack *Caragana*, *Elaeagnus*, *Malus*, *Prunus*, *Pyrus* and *Salix* across its native central and eastern Asian range (Wood and Bright 1992; Bright and Skidmore 1997, 2002; Negrón et al. 2005).

S. schevyrewi is of immediate concern as a potential vector of Dutch elm disease (DED), caused by the fungal pathogens *Ophiostoma himal-ulmi* Brasier & M.D. Mehrota, *Ophiostoma novo-ulmi* Brasier and *Ophiostoma ulmi* (Buisman) Nannf. (Harrington et al. 2001). Jacobi et al. (2007) isolated DED from adult *S. schevyrewi* emerging from infected *Ulmus americana* L. at levels similar to those from co-

[1] Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, 506 West Burnside Road, Victoria, BC, V8Z 1M5
[2] Canadian Food Inspection Agency, 506 West Burnside Road, Victoria, BC, Canada, V8Z 1M5
[3] Canadian Food Inspection Agency, Forestry Division, 1853 Bredin Road, Kelowna, British Columbia, V1Y 7S9
[4] Canadian Food Inspection Agency, Plant Health Surveillance Unit, 4321 Still Creek Drive, Burnaby, British Columbia, V5C 6S7

emergent European elm bark beetle, *Scolytus multistriatus* (Marsham), the primary vector of DED in North America. Concurrently, Koski and Jacobi (2007) demonstrated that DED was transmitted to feeding wounds during maturation feeding by *S. schevyrewi* adults artificially inoculated with the disease. The efficiency of *S. schevyrewi* as a disease vector remains unknown as neither its efficiency as a DED vector (Lee et al. 2009) nor field transmission of DED from infected to uninfected elms have been determined (Negrón et al. 2005). However, the evidence suggests that the risk of *S. schevyrewi* serving as an additional vector of DED is very high. We report the first records for *S. schevyrewi* in British Columbia (BC) and document its seasonal occurrence.

MATERIALS AND METHODS

S. schevyrewi was detected in traps near Kelowna, BC during ongoing trials to test the efficacy of bottle traps relative to 12-unit multiple funnel traps (ConTech Inc., Delta, BC). Each bottle trap was constructed from an inverted clear 2-liter pop bottle with half of the circumference of the side wall removed. The threaded portion of the bottle's neck was inserted into a 2.54 cm diameter hole drilled in the lid of a 16 oz white plastic cosmetic jar (Industrial Plastics, Victoria, BC). The trap and the lures were hung from the pivoting triangular loops of picture frame hangers riveted (2.7 cm below the base) to the outside and inside walls of the bottle, respectively.

Ten replicates of a bottle trap paired with a funnel trap were established on a berm on the west margin of the Glenmore Landfill (49.9556º, -119.4235º). The landfill is situated in the Okanagan Very Dry Hot Ponderosa Pine Variant (PPxh1) of the Ponderosa Pine biogeoclimatic zone (Hope et al. 1991); ridges dominated by Ponderosa pine (*Pinus ponderosa* P. & C. Lawson) are present 70 m west of and 800 m east of the berm. The berm is landscaped with both ornamental and native trees including Colorado blue spruce (*Picea pungens* Engelm.), corkscrew willow (*Salix* sp.), Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco), Lombardy poplar (*Populus nigra* L. cv. 'Italica'), London plane (*Platanus* x *acerifolia* (Air.) Willd.), maple (*Acer* spp.), mountain ash (*Sorbus* sp.), Ponderosa pine, Russian olive (*Elaeagnus angustifolia* L.), Scots pine (*Pinus sylvestris* L.), and sumac (*Rhus* sp.).

All traps were baited with a proprietary release system releasing multistriatin, 4-methyl-3-heptanol and alpha-cubebene at sub-milligram rates per day at 20 ºC (ConTech Inc., Delta, B.C.) and half of the replicates were also baited with a half-size ultra-high release ethanol lure (270 mg/day at 20 ºC, ConTech Inc., Delta, B.C.). The primary lure for the experiment was selected to target *S. multistriatus,* which is widely distributed in the study area (van Sickle and Fiddick 1982). Traps within a pair were separated by 4-5 m and pairs were separated by at least 30 m. Collecting cups contained 125 ml of propylene glycol to retain any captured insects. Traps were deployed on 13 April 2010 and serviced approximately every two weeks through 5 August 2010 when all lures were replaced. The screening aid of LaBonte et al. (2003) was used to separate *S. schevyrewi* from other species of *Scolytus* present in the samples. While the experiment is still ongoing and identifications of all insects captured are not complete, all *S. multistriatus* and *S. schevyrewi* recovered to 28 September 2010 have been determined. Because *S. schevyrewi* is new to the fauna of British Columbia, we feel it is important to document its occurrence in the province prior to the completion of the study.

RESULTS

In total 27, 551 *S. multistriatus* and 58 *S. schevyrewi* were captured between 13 Apr. and 28 Sep. 2010. Collection dates [number of males and females] for *S. schevyrewi* are: 12-28.v.2010 [1♂, 4♀]; 28.v-11.vi.2010 [3♂]; 11-28.vi.2010 [15♂, 4♀]; 28.vi.-15.vii.2010 [11♂, 10♀]; 15-28.vii.2010 [2♂, 4♀]; 5-20.viii.2010 [1♂]; and 2-28.ix.2010 [1♂, 2♀] No *S. schevyrewi* were recovered from the 13-29.iv.2010, 29.iv-12.v.2010, 28.vii-5.viii.2010 and the 20.viii-2.ix.2010 sample periods. In contrast, *S. multistriatus* was recovered throughout the complete sampling period. Voucher specimens of *S. schevyrewi* have been deposited in the Canadian National Collection (CNC), Ottawa, ON; the Royal British Columbia Museum (RBCM), Victoria, B.C., Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre (PFCA), Victoria, BC; and the Spencer Entomological Collection (UBCZ), Beaty Biodiversity Museum, University of British Columbia, Vancouver, BC.

DISCUSSION

The high numbers of *S. multistriatus* and the detection of *S. schevyrewi* at the Kelowna landfill are surprising as no *Ulmus* are planted on the site. Sixteen elms were located around a parking lot 400 m to the north and scattered mature trees were also noted on a rural property 725 m south of the trap line. Deciduous hosts growing along the berm at the landfill and dead and dying limbs of the elms to the north of the landfill were examined by LMH, EJ and MN on 5 August 2010 for signs of attack by bark beetles. None of the hosts exhibited signs of attack, thus the source of the *S. multistriatus* and *S. schevyrewi* populations remains unknown. The traps were also well removed from two other potential sources of the *Scolytus* spp., yard waste and solid wood packaging. The collection site for urban yard waste is 600-800 m to the northeast, while that for wood waste is 600-700 m to the east.

Scolytus schevyrewi has replaced *S. multistriatus* as the predominant bark beetle attacking elms in Colorado, Utah and New Mexico (Lee et al 2009) and has been implicated as the causal agent of Siberian elm, *Ulmus pumila* L., mortality in Colorado (Negrón et al 2005). Siberian elm is widely planted in the arid interior of BC and has naturalized in the Okanagan, Similkameen and Kettle valleys (Brayshaw 1996), and may be impacted by *S. schevyrewi* populations.

ACKNOWLEDGEMENTS

We thank the City of Kelowna for allowing access to the Glenmnore Landfill for the trapping experiment. We are grateful to Vince Nealis, Les Safranyik and two anonymous reviewers for their helpful comments on the manuscript.

REFERENCES

Brayshaw, T.C. 1996. Trees and shrubs of British Columbia. Royal British Columbia Museum Handbook. UBC Press, Vancouver.

Bright, D.E. and R.E. Skidmore. 1997. A catalog of Scolytidae and Platypodidae (Coleoptera), Supplement 1 (1990-1994), NRC Research Press, Ottawa.

Bright, D.E. and R.E. Skidmore. 2002. A catalog of Scolytidae and Platypodidae (Coleoptera), Supplement 2 (1995-1999), NRC Research Press, Ottawa.

CABI/EPPO 2009. *Scolytus schevyrewi*. Distribution Maps of Plant Pests No. 729. CABI Head Office, Wallingford, UK [online]. Available from http://www.cabi.org/cabdirect/

FullTextPDF/2009/20093321026.PDF [accessed 11 Aug. 2009].

Harrington, T.C., D. McNew, J. Steimal, D. Hofstra and R. Farrell 2001. Phylogeny and taxonomy of the *Ophiostoma piceae* complex and the Dutch elm disease fungi. Mycologia 93: 111-136.

Hope, G.D., D.A. Lloyd, W.R. Mitchell, W.R. Erickson, W.L. Harper and B.M. Wikeem. 1991. Chapter 9: Ponderosa Pine Zone *In* Ecosystems of British Columbia. British Columbia. *Edited by* D.V. Meidinger, and J. Pojar, Ministry of Forests Special Report Series No. 6. *pp*. 139-151 [online]. Available from http://www.for.gov.bc.ca/hfd/pubs/Docs/Srs/Srs06.pdf [accessed 25 Aug. 2010].

Jacobi, W.R., R.D. Koski, T.C. Harrington and J.J. Witcosky. 2007. Association of *Ophiostoma novo-ulmi* with *Scolytus schevyrewi* (Scolytidae) in Colorado. Plant Disease 91: 245-247.

Koski, R.D. and W.R. Jacobi. 2007. Vectoring capabilities of the banded elm bark beetle (*Scolytus schevyrewi* Semenov) in relation to the Dutch elm disease fungus (*Ophiostoma novo-ulmi* Brasier) in Colorado. Phytopathology 97: S59.

LaBonte, J.R., R.J. Rabaglia and E.R. Hoebeke. 2003. A screening aid for the identification of the banded elm bark beetle, *Scolytus schevyrewi* Semenov [online] http://ceris.purdue.edu/napis/pests/barkb/schevy/schevyrewiIDnew1A.pdf [accessed 19 Oct. 2003].

Langor, D.W., L.J. DeHaas and R.G. Foottit. 2009. Diversity of non-native terrestrial arthropods on woody plants in Canada. Biological Invasions 11: 5-19.

Lee, J.C., I. Aguayo, R. Aslin, G. Durham, S.M. Hamud, B. Moltzan, A.S. Munson, J.F. Negrón, T. Peterson, I.R. Ragenovich, J.J Witcosky and S.J. Seybold. 2009. Co-occurence of the invasive banded and European elm bark beetles (Coleoptera: Scolytidae) in North America. Annals of the Entomological Society of America 102: 426-436.

NAPIS (National Agriculture Pest Information System). 2010. Pest Tracker: Reported Status of Banded Elm Bark Beetle - *Scolytus schevyrewi* [online]. Available from http://pest.ceris.purdue.edu/searchmap.php?selectName=INBQSGA [accessed 11 Aug. 2010].

Negrón, J.F., J.J. Witcosky, R.J. Cain, J.R. LaBonte, D.A. Duerr, S.J. McElwey, J.C. Lee and S.J. Seybold. 2005. The banded elm bark beetle: a new threat to elms in North America. American Entomologist 51: 84-94.

Van Sickle, G.A. and R.L. Fiddick. 1982. Forest Insect and Disease Survey 1979, Pacific region. *In* Annual reports of the Forest Insect and Disease Survey 1978 and 1979. Canadian Forestry Service, Department of the Environment, Ottawa, Ont. *pp*. 71–79.

Wood, S.L. and D.E. Bright. 1992. A catalog of Scolytidae and Platypodidae (Coleoptera), Part 2: Taxonomic index, volume A. Great Basin Naturalist Memoirs 13: 1-833.