BioOne COMPLETE

First Incidence of Sinoxylon Indicum and Sinoxylon Sudanicum (Coleoptera: Bostrichidae) in Mississippi

Authors: Chase, Kevin D., Schiefer, Terence L., and Riggins, John J.

Source: Florida Entomologist, 95(3) : 767-770

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/024.095.0329

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

FIRST INCIDENCE OF *SINOXYLON INDICUM AND SINOXYLON SUDANICUM* (COLEOPTERA: BOSTRICHIDAE) IN MISSISSIPPI

KEVIN D. CHASE, TERENCE L. SCHIEFER AND JOHN J. RIGGINS*
Department of Biochemistry, Molecular Biology, Entomology, and Plant Pathology, Box 9775, Mississippi State University, Mississippi State, MS 39762-9775

*Corresponding author; E-mail: jriggins@entomology.msstate.edu

Auger beetles (Coleoptera: Bostrichidae), also known as false powderpost beetles, are serious pests of trees, forest products, agricultural crops, and stored vegetable products in most regions of the world (Fisher 1950; Lawrence 2010). There are approximately 570 species in 89 genera worldwide (Lawrence 2010), including approximately 73 native species found in North America (Ivie 2002). Most woodboring bostrichids obtain nutrition from starch, enabling many species to utilize almost any dry wood material from an enormous host range (Ivie 2002). The frequency of non-native bostrichid interceptions at ports of entry and storage facilities around the world has increased during the last decade (Teixeira et al. 2002; Ratti 2004; Filho et al. 2006; Aukema et al. 2011; EPPO 2011; Price et al. 2011). Bostrichids, along with many other woodboring insects, are often accidentally introduced inside solid wood packing material in containerized cargo (Haack 2006).

The bostrichid genus *Sinoxylon* Duftschmid contains 52 species, all of which are native to Asia, Africa, and Southern Europe (Borowski & Wegrzynowicz 2007) and are typically not considered primary pests. *Sinoxylon* species utilize a wide variety of hosts, including numerous trees, shrubs, herbaceous plants, and bamboos (Filho et al. 2006). *Sinoxylon* damage is typically caused by the boring of adults and larvae in the stems, branches, or twigs of dead, damaged, or stressed hosts (Nair 2007). One species has even been known to damage lead cables (Filho et al. 2006). Species of *Sinoxylon* are frequently intercepted in the U.S.A., representing 32% of bostrichid interceptions between 1985 and 2000 (Haack 2006; Price et al. 2011). There have been 289 *Sinoxylon* interceptions in the U.S.A. between 2007 and 2012 (Brian Saunders, USDA-APHIS-PPQ, Cape Canaveral, Florida, personal communication).

In the continental U.S.A., there are 2 established non-native species of *Sinoxylon*. *Sinoxylon anale* Lesne and *S. conigerum* Gerstäcker are both established in southern Florida (Peck & Thomas 1998). Another species, *S. ceratoniae* (L.), may be established in California (Ivie 2002). *Sinoxylon anale* Lesne is the most economically important and most commonly intercepted species of *Sinoxylon*, typically arriving in solid wood packing materials (Fisher 1950; Argaman 1987; Teixeira et al. 2002; Sittachaya et al. 2009; Beaver et al. 2011). *Sinoxylon anale* is native to the Indomalaya and Palearctic ecozones, where it attacks more than 70 species of plants. In the United States, Price et al. (2011) reported 2 interceptions of *S. anale* in Georgia in 2004 and 2010, both arriving from India in solid wood packing materials. Borowski and Wegrzynowicz (2007) list 3 other species, *S. japonicum* Lesne, *S. sexdentatum* (Olivier) (as *S. muricatum* (L.)), and *S. ruficorne* Fahaeus, as introduced into the United States, but these records are apparently based on the interceptions reported by Fisher (1950) that do not represent established populations.

On 29 Aug 2011 in West Point, Mississippi, United States (N 33°36'25" W 88°39'01"), a substantial infestation of larval and adult *Sinoxylon indicum* Lesne (Fig. 1A) and *S. sudanicum* Lesne (Fig. 1B) was discovered in wooden crates and pallets that originated from Pakistan. It is not known if the wood used to construct the crates originated in Pakistan, or whether the wood was treated according to IPPC international standards

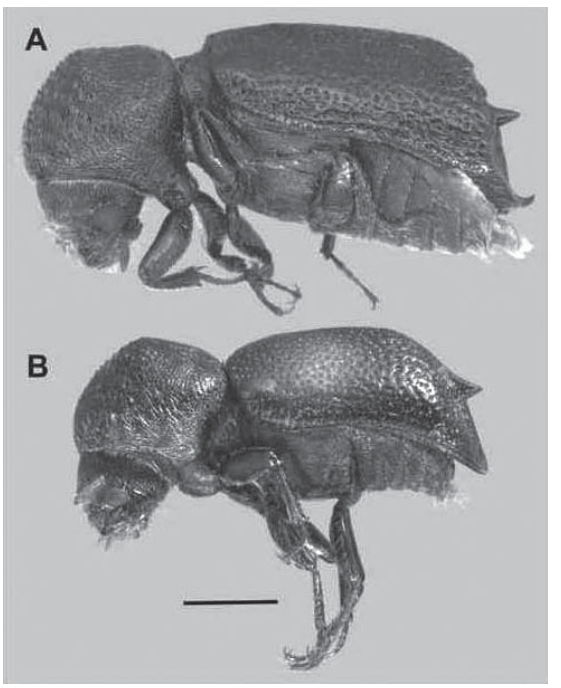


Fig. 1. Lateral views of *Sinoxylon* species intercepted in West Point, Mississippi during 2011. A) *S. indicum*; B) *S. sudanicum*. Scale bar = 1mm.

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

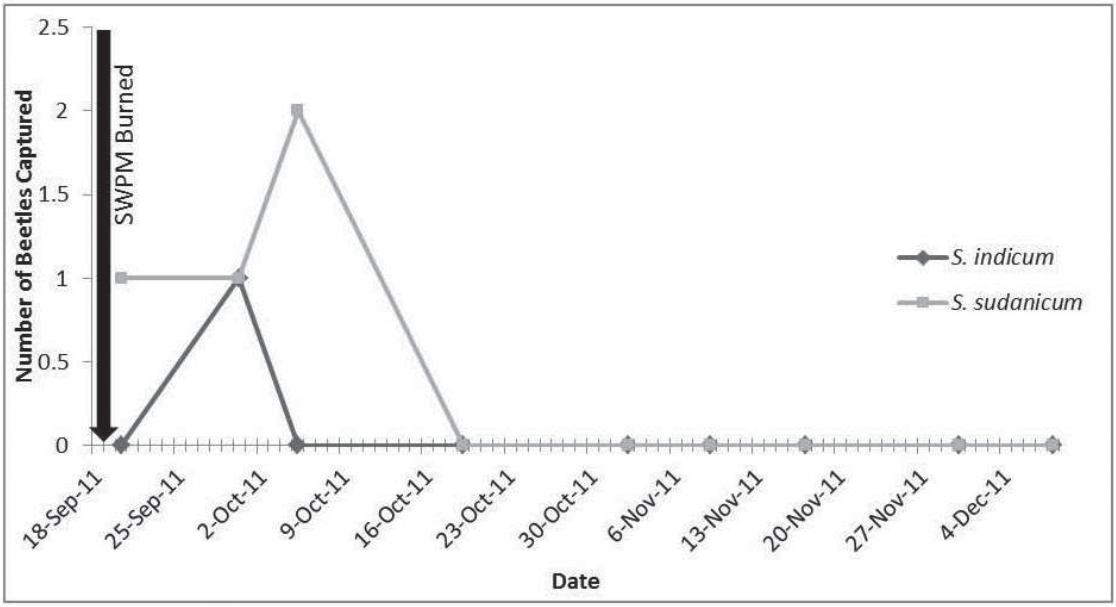


Fig. 2. *Sinoxylon indicum* and *S. sudanicum* captures in Lindgren funnel traps baited with ethanol lures in West Point, Mississippi. Arrow indicates date that solid wood packing materials (SWPM) were burned.

for wood packaging. Voucher specimens were collected and deposited in the Mississippi Entomological Museum at Mississippi State University. The infested wooden crates were being stored outside the warehouse and were not burned until 19 Sep 2011, 3 wk after the damage was discovered, giving the beetles ample opportunity to disperse. To monitor for *Sinoxylon* presence in the nearby environment, 2 Lindgren 12-funnel traps (Lindgren 1983) baited with an ultra high release (UHR) ethanol gel lure (PheroTech, Delta, British Columbia) with an elution rate of 275 mg/day (Silk et al. 2006) were placed 23 and 49 m from the site of the wooden crates and checked periodically from 6 Sep 2011 to 8 Dec 2011. Adults of *S. indicum* and *S. sudanicum* were captured in traps after all crates had been incinerated (Fig. 2), indicating that both species dispersed into the environment or were still present inside the adjacent warehouse. Traps will be utilized again in Spring 2012 to monitor for overwintering survivorship of either species.

Sinoxylon indicum has been intercepted 4 times in the United States at ports in California (San Francisco), Georgia (Savannah) and Washington (Blaine and Seattle), with all shipments originating from India (Joel Floyd, USDA-APHIS-PPQ, Riverdale, Maryland, personal communication). It has also been intercepted within wood packing material in Belgium (EPPO 2008). The native recorded range of *S. indicum* is Burma and India (Borowski & Wegrzynowicz 2007), where it is reported as a pest of *Prosopis cineraria* (L.) Druce, the state tree of Rajasthan, India. Two predators of *S. indicum*, *Melambia* sp. (Trogossitidae) and *Psuedobothrideres* sp. (Bothrideridae), were reported to feed on *S. indicum* and *S. pugnax* Lesne inside of *P. cineraria* (Parihar & Singh 1998).

Sinoxylon sudanicum, has also been intercepted at various ports of entry in the United States (Robert Beiriger, Everglades Research & Education Center, Belle Glade, Florida, personal communication). Its native range includes Sudan, Senegal, Egypt, Yemen, Pakistan and India, but it has also been intercepted in Germany (Gentry 1965; Borowski & Wegrzynowicz 2007) and Venice, Italy (Ratti 2004). This species is a stem borer of soft woody hosts including mangoes (*Mangifera indica* L.) (Srivastava 1997, Biosecurity Australia 2008), agathi (*Sesbania grandiflora* (L.) Pers.), and young fig trees (*Ficus* sp. L.) in Sudan, where it most often attacks weakened nursery stock (King 1911). Additionally, *S. sudanicum* is reported from Cambodia cotton (*Gossypium hirsutum* L.) in western Pakistan and southern India, within wilted stalks of cotton killed by a stem weevil (Fletcher 1914; Ayyar & Margabandhu 1944; Sabesh 2007).

Sinoxylon sudanicum is best known in its native range as a destructive borer of wooden furniture (Fletcher 1914; Ananthakrishnan 2004). Reddy & Urs (1991) investigated natural extracts of several plants as potential antifeedants and repellants, attempting to reduce the impact of *S. sudanicum* on furniture. They concluded that *Pterocarpus marsupium* Roxb. (Indian Kino Tree) and *Terminalia paniculata* Roth (Kindal) con-

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

tained antifeedants and *Vateria indica* L. (Damar Tree) contained repellants. *Spathius critolaus* Nixon (Hymenoptera: Braconidae) is a parasitoid of *S. sudanicum* in cotton (Ayyar 1941), and the globular mite, *Pediculoides ventricosus* Newport (Acarina: Pediculoidae), was found preying on immature stages of *S. sudanicum* and *S. critolaus* (Ayyar & Margabandhu 1944).

The historic records for both species of *Sinoxylon* indicate that solid wood packing material is the most common source of interceptions of infested material, aligning with our encounter in Mississippi. It is troubling that the shipment was not intercepted at the port, and that it was successfully delivered to its destination. The destructive, woodboring habits of many species within the genus *Sinoxylon* as well as other bostrichids indicate a potential for economic damage in the USA. It is vital to implement more stringent monitoring of imported solid wood packing materials to help prevent the establishment of these and other destructive pests (Price et al. 2011). Currently, USDA-APHIS does not recognize bostrichids as actionable pests (a pest that triggers quarantine actions), and we recommend here that this policy be re-considered.

We would like to thank Michael Thomas (Florida State Collection of Arthropods, Gainesville, Florida) and Robert Beiriger (Everglades Research & Education Center, Belle Glade, Florida) for confirming species identifications, and Joe MacGown (Mississippi Entomological Museum) for assistance in taking photographs.

Summary

In Aug 2011, 2 exotic auger beetle species, *Sinoxylon indicum* and *Sinoxylon sudanicum*, were found in northeastern Mississippi infesting wooden crates that had originated in Pakistan. Species of *Sinoxylon* attack timber products and a wide range of woody and herbaceous plants, including important agricultural crops.

References Cited

Ananthakrishnan, T. N. 2004. General and Applied Entomology 2nd ed. Tata Mcgraw-Hill, New Delhi. 1184 pp.

Argaman, Q. 1987. *Sinoxylon anale*—a new destructive wood borer in Israel. Phytoparasitica 15: 257.

Aukema, J. E., Leung, B., Kovacs, K., Chivers, C., Britton, K. O., Englin, J., Frankel, S. J., Haight, R. G., Holmes, T. P., Liebhold, A. M., Mccullough, D. G., and Von Holle, B. 2011. Economic impacts of non-native forest insects in the continental United States. PLoS ONE 6: e24587. doi:10.1371/journal.pone.0024587.

Ayyar, P. N. K. 1941. The biology and distribution of the parasites of the cotton stem weevil, *Pempheres affinis* Fst. in South India. Acad. Sci., Sect. B. 14: 437-453.

Ayyar, P. N. K., and Margabandhu, B. 1944. Biological notes on *Sinoxylon sudanicum* Lesne and its parasites in S. India. Bombay Nat. Hist. Soc. 44: 460-465.

Beaver, R. A., Sittichaya, W., and Liu, L.-Y. 2011. A review of the Powder-Post Beetles of Thailand (Coleoptera: Bostrichidae).Trop. Nat. Hist. 11: 135-158.

Biosecurity Australia. 2008. Provisional Final Import Risk Analysis Report for Fresh Mango Fruit from India. Biosecurity Australia, Canberra. 171 pp.

Borowski, J., And W grzynowicz, P. 2007. World Catalogue of Bostrichidae (Coleoptera). Wydawnictwo Mantis, Olsztyn, Poland. 247 pp.

EPPO [European and Mediterranean Plant Protection Organization]. 2008. EPPO report on notifications of non-compliance. EPPO Reporting Service 2008/187.

EPPO [European and Mediterranean Plant Protection Organization]. 2001. EPPO report on notifications of non-compliance. EPPO Reporting Service 2011/062.

Filho, O. P., Teixeira, E. P., Bezerra, M. L. M., Dorval, A., and Filho, E. B. 2006. First record of *Sinoxylon conigerum* Gerstäcker (Coleoptera: Bostrichidae) in Brazil. Neotrop. Entomol. 35: 712-713.

Fisher, W. S. 1950. A revision of the North American species of beetles belonging to the Family Bostrichidae. U.S. Department of Agriculture, Misc. Publ. 698. 157 pp.

Fletcher, T. B. 1914. Some south Indian insects and other animals of importance, considered especially from an economic point of view. Superintendent, Government Press, Madras, India. 565 pp.

Gentry, J. W. 1965. Crop insects of northeast Africa-southwest Asia. U.S. Dept. Agric. Agriculture Handbook 273. 210 pp.

Haack, R. A. 2006. Exotic bark- and wood-boring Coleoptera in the United States: recent establishments and interceptions. Canadian J. For. Res. 36: 269-288.

Ivie, M. A. 2002. Bostrichidae Latreille 1802, pp. 233-244 *In* R. H. Arnett, Jr., M. C. Thomas, P. E. Skelley and J. H. Frank [eds.], American Beetles, Volume 2: Polyphaga: Scarabaeoidea through Curculionoidea. CRC Press, Boca Raton, Florida. xiv+861 pp.

King, H. H. 1911. Report of the entomological section of the Wellcome Tropical Research Laboratories, pp. 95-150 *In* A. Balfour [ed.], Fourth Report of the Wellcome Tropical Research Laboratories at the Gordon Memorial College, Khartoum, Vol. B: General Science. Balliere, Tindall and Cox, London. 333 pp.

Lawrence, J. F. 2010. Bostrichidae Latreille 1802, pp. 209-217 *In* R. A. B. Leschen, R. G. Beutel and J. F. Lawrence [eds.], Handbook of Zoology, Arthropoda: Insecta, Coleoptera, Beetles. Vol. 2: Morphology and Systematics (Elateroidea, Bostrichiformia, Cucujiformia partim). Walter de Gruyter, Berlin. xiii+786 pp.

Lindgren, B. S. 1983. A multiple funnel trap for scolytid beetles (Coleoptera). Canadian Entomol. 115: 299-302.

Nair, K. S. S. 2007. Tropical Forest Insect Pests: Ecology, Impact, and Management. Cambridge University Press, New York. 404 pp.

Parihar, D. R., and Singh, M. P. 1998. Insects associated with *Prosopsis cineraria* in arid western Rajasthan, India. *In* J. C. Tewari, N. M. Pasiecznik, L. N. Harsh and P. J. C. Harris [eds.], *Prosopis* Species in the Arid and Semi-Arid Zones of India. Proc. Conference Central Arid Zone Research Inst., Jodhpur, Rajasthan, India. 21-23 Nov 1993. The Prosopis Society of

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

India, Jodhpur and the Henry Doubleday Research Assoc., Coventry, U.K. 128 pp.

Peck, S. B., and Thomas, M. C. 1998. A Distributional Checklist of the Beetles (Coleoptera) of Florida. Arthropods of Florida and Neighboring Land Areas 16. Florida Dept. Agric. Consumer Serv., Gainesville, Florida. viii+180pp.

Price, T., Brownell, K. A., Raines, M., Smith, C. L., and Gandhi, K. J. K. 2011. Multiple detections of two exotic Auger Beetles of the genus *Sinoxylon* (Coleoptera: Bostrichidae) in Georgia, USA. Florida Entomol. 94: 354-355.

Ratti, E. 2004. Coleoptera Lyctidae e Bostrichidae intercettati nel porto e negli ambienti urbani di Venezia. Boll. Mus. Civ. Stor. Nat. Venezia. 55: 121-125.

Reddy, G. V. P., and Urs, K. C. D. 1991. Antifeedant and repellant activity of some indigenous plant extracts against the furniture beetle, *Sinoxylon sudanicum* Lesne (Coleoptera: Bostrychidae), pp. 173-185 *In* O. P. Agrwal and S. Dhawan [eds.], Biodeterioration of Cultural Property. Proc. Int. Conference on Biodeterioation of Cultural Property, in Collaboration with ICCROM and INTACH. India. 20-25 Feb 1989. MacMillan India, New Delhi. xiv+493 pp.

Sabesh, M. 2007. List of Insects and Mite Pests of Cotton in India. URL: http://www.cicr.org.in/research_notes/insec_mite_pest.pdf. Accessed on 17 Jan 2012.

Silk, P. J., Sweeney, J., Wu, J., Price, J., Gutowski, J. M., and Kettela, E. G. 2007. Evidence for a male-produced pheromone in *Tetropium fuscum* (F.) and *Tetopium cinnamopterum* (Kirby) (Coleoptera: Cerambycidae). Naturwissenschaften 94: 697-701.

Sittichaya, M. A., Beaver, R. A., Liu, L.-Y., and Ngampongsai, A. 2009. An illustrated key to powder post beetles (Coleoptera: Bostrichidae) associated with rubberwood in Thailand, with new records and a checklist of species found in southern Thailand. Zookeys 26: 33-51.

Srivastava, R. P. 1997. Mango Insect Pest Management, 1st ed. International Book Distributing Co., Lucknow, India. 272 pp.

Teixeira, É. P., Novo, J. P. S, and Filho, E. B. 2002. First record of *Sinoxylon anale* Lesne and *Sinoxylon senegalensis* (Karsch) (Coleoptera: Bostrichidae) in Brazil. Neotrop. Entomol. 31: 651-652.

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 29 Mar 2024
Terms of Use: https://bioone.org/terms-of-use