Invasive Species Compendium

Datasheet report for Trirachys holosericeus (apple stem borer)

Pictures

Picture	Title	Caption	Copyright
	Adult	Trirachys holosericeus (apple stem borer); adult. Nachane, Maharashtra, India. October 2008.	©Vishals_Lab (Vishal Bhave) - CC BY-NC-SA
	Pupae	Trirachys holosericeus (apple stem borer); pupae.	©S.M. Gaikwad & N.K. Patil/Department of Zoology, Shivaji University, Kolhapur, Maharashtra, India
	Larva	Trirachys holosericeus (apple stem borer); mature larva.	©S.M. Gaikwad & N.K. Patil/Department of Zoology, Shivaji University, Kolhapur, Maharashtra, India

Identity

Preferred Scientific Name

Trirachys holosericeus (Fabricius, 1787)

Preferred Common Name

apple stem borer

Other Scientific Names

Aeolesthes holosericea (Fabricius, 1787)
Aeolesthes holosericeus (Fabricius, 1787)
Aeolesthes velutina (Thomson, 1865)
Cerambyx holosericeus Fabricius, 1787
Hammaticherus holosericeus (Fabricius, 1787)
Neocerambyx holosericeus (Fabricius, 1787)
Pachydissus similis Gahan, 1890
Pachydissus velutinus Thomson, 1865

Local Common Names

India: apple tree borer; cherry tree borer

Summary of Invasiveness

Trirachys holosericeus, a highly polyphagous longhorned beetle, is native to southern Asia from Pakistan to the Philippines. It is a stem-boring pest in natural and planted forests and fruit trees. It attacks primarily hardwoods, and at least one conifer. Both healthy and stressed trees are attacked, often leading to crown dieback and possibly tree death after one or more years of infestation. Cut logs can remain attractive to egg-laying adults for nearly a year after felling. *T. holosericeus* has not become established outside its native range of Asia, but it could be moved inadvertently in live plants, logs, and solid wood packaging. Chemical treatments, including injecting insecticides into active galleries, are often used on live trees, especially fruit trees. In forest stands, heavily infested trees are often cut and destroyed. For recently cut logs, rapid transport to sawmills and quick utilization, or at least debarking, are recommended.

Taxonomic Tree

Domain: Eukaryota
  Kingdom: Metazoa
    Phylum: Arthropoda
      Subphylum: Uniramia
        Class: Insecta
          Order: Coleoptera
            Family: Cerambycidae
              Genus: Trirachys
                Species: Trirachys holosericeus

Notes on Taxonomy and Nomenclature

The scientific name *Trirachys holosericeus* was established by Vitali et al. (2017) (datasheetreport/3428#e16fc400-768f-40e8-966b-d38108dd2e9a) when transferred from the binomial *Aeolesthes holosericea,* which was in general usage for over a century since it was proposed by Gahan (1906) (datasheetreport/3428#1e3b1730-5e11-43ff-89f5-cfbfb315c62e). Therefore, most scientific papers dealing with this insect refer to *Aeolesthes holosericea*, as well as most internet resources at the time of writing in 2019.

The genus *Trirachys* was originally described by Hope (1843) (datasheetreport/3428#2a3e94bd-46fa-4643-8899-5332c4a57400) and the genus *Aeolesthes* by Gahan (1890) (datasheetreport/3428#328ed33f-bcf4-44fa-a508-0711a21dcbaa). The type species selected for *Trirachys* had an armed prothorax, whereas the prothorax was unarmed in the type species selected for *Aeolesthes*. In addition, there were differences in the location of spines along the antennal segments between the two type species. Vitali et al. (2017) (datasheetreport/3428#e16fc400-768f-40e8-966b-d38108dd2e9a), however, noted wide variation among the species of *Trirachys* and *Aeolesthes* in occurrence and placement of spines on the prothorax and antennae, and therefore conducted a major revision that resulted in transferring *A. holosericea* to *Trirachys* along with using the original species epithet used when this species was first described by Fabricius (1787) (datasheetreport/3428#f1ac3d5c-26c8-4493-b5d3-48b67006fc9f) as *Cerambyx holosericeus.* It is important to note that Gahan (1891) (datasheetreport/3428#4ecbca9d-025b-4fc2-a010-78b6780d6833) synonymized *Cerambyx holosericeus* and three other binomials under the name *Aeolesthes holosericeus* in 1891, but later apparently misspelled the species epithet as *holosericea* in his later publication (Gahan 1906 (datasheetreport/3428#1e3b1730-5e11-43ff-89f5-cfbfb315c62e)), which then continued in common usage until the recent revision by Vitali et al. (2017) (datasheetreport/3428#e16fc400-768f-40e8-966b-d38108dd2e9a).

Description

Trirachys holosericeus is a typical longhorned beetle (also called longhorn or longicorn beetles) in which the body is elongate and the antennae are as long as or longer than the beetle's body length, depending on the sex. Detailed descriptions of the adults and other life stages can be found in Stebbing (1914), Beeson (1941) and Duffy (1968). Vitali et al. (2017) (datasheetreport/3428#e16fc400-768f-40e8-966b-d38108dd2e9a) provided a key for several genera of Oriental Cerambycini, including *Aeolesthes* and *Trirachys*, along with several characters that are possessed by *T. holosericeus.*

Eggs

Eggs are white, shiny, oval and have a short stalk-like process at one end (Gardner, 1925). Typical egg length and width were reported, respectively, as 2.5 mm and 1.4 mm by Gardner (1925) and 2.2 mm and 0.8-1.2 mm by Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0). Drawings and photos of *T. holosericeus* eggs appear in Gardner (1925), Rahman and Khan (1942), Mamlayya (2011) (datasheetreport/3428#3fc96388-91f1-49f0-8012-ed9d049ab745), and Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0).

Larva

Detailed descriptions of *T. holosericeus* larvae are given in Gardner (1925) and Duffy (1968). Larvae are yellowish-white in body colour, cylindrical, with a brown head, black mandibles, and a hard dorsal brown thoracic plate (Stebbing, 1914; Gardner, 1925). Reports on typical length of mature larvae vary from 45 mm (Gardner, 1925) to 75 mm by (Rahman and Khan, 1942). Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0) stated that *T. holosericeus* has seven larval instars, with final instars averaging 60 mm long. Therefore, it is likely that the larvae examined by Gardner (1925) were not final instars. The regions between abdominal segments of larvae are highly constricted, giving the abdomen a corrugated appearance (Stebbing, 1914). Larvae have very short, distinct 4-segmented legs (Gardner, 1925; Rahman and Khan, 1942). Drawings and photos of *T. holosericeus* larvae appear in Gardner (1925), Rahman and Khan (1942), Mamlayya (2011) (datasheetreport/3428#3fc96388-91f1-49f0-8012-ed9d049ab745), Salve (2012) (datasheetreport/3428#2a202771-3534-4bbd-a1cb-044769bafb0e) and Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0).

Pupa

Pupae are yellowish-white in colour and 30-42 mm in length (Stebbings, 1914; Beeson, 1941; Gardner, 1925; Rahman and Khan, 1942; Gupta and Tara, 2013 (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0)). The pupae are of the typical exarate type in which appendages are free from the body. Images of *T. holosericeus* pupae appear in Rahman and Khan (1942) and Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0).

Adult

Adults are elongate, parallel sided, dark brown to reddish brown in colour, with patches of grayish to light-brown pubescence on the elytra that give the beetle a silky appearance (Stebbing, 1914; Beeson, 1941; Duffy 1968). Most authors reported that adults are 20-36 mm long (Gahan, 1906 (datasheetreport/3428#1e3b1730-5e11-43ff-89f5-cfbfb315c62e); Stebbing, 1914; Duffy 1968; Wang

2017 (datasheetreport/3428#76d8c9a2-558e-4bcc-9e76-3f14c2ca6a9e)), however, a range of 38-45 mm was given by Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0). Females tend to be larger than males (Tara et al., 2009 (datasheetreport/3428#e2300177-fa8b-4c94-a39d-3a780ef87198); Gupta and Tara, 2013 (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0)). The sides of the prothorax are rounded, not armed, and the pronotum is highly wrinkled (rugose) (Stebbing, 1914; Beeson, 1941). Antennae tend to be about 1.5 times the length of the body in males, whereas in females the antennae are about the same length as the body (Beeson, 1941). Drawings and images of *T. holosericeus* adults appear in several publications, including Stebbing (1914), Rahman and Khan (1942), Duffy (1968), Sengupta and Sengupta (1981) (datasheetreport/3428#c2f7e3e2-1a87-4d8c-9e08-75af678e853d), Mamlayya (2011) (datasheetreport/3428#3fc96388-91f1-49f0-8012-ed9d049ab745), and Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0), Salve (2014) (datasheetreport/3428#4D851A0D-1D50-48DE-9B1D-94354360DD92), Bhawane et al. (2015) (datasheetreport/3428#2907da9e-b360-469c-8f65-69f166e916cf), Jiji et al. (2016) (datasheetreport/3428#b28ce736-c369-4e79-a492-88be4ff660ba), Kariyanna (2016) (datasheetreport/3428#24a1a456-b954-48b0-a7aa-369fe726b5e7), More et al. (2017) (datasheetreport/3428#c02d3530-bbef-4017-b64f-44f1e2abdbbc) and Kariyanna et al. (2018) (datasheetreport/3428#c336a7a7-0710-4ea0-8d0e-b4ce292ad000).

Distribution

Trirachys holosericeus is native to several countries in South Asia (Bangladesh, Bhutan, India, Pakistan and Sri Lanka), East Asia (China and Hong Kong), and Southeast Asia (Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand and Vietnam). It occurs from sea level into sub-montane valleys of the Himalayas and in both moist and dry forests (Beeson, 1941; Rahman and Khan, 1942).

Distribution Table

The distribution in this summary table is based on all the information available. When several references are cited, they may give conflicting information on the status. Further details may be available for individual references in the Distribution Table Details section which can be selected by going to Generate Report.

Last updated: 30 Apr 2020

Continent/Country/Region	Distribution	Last Reported	Origin	First Reported	Invasive	Re
Asia						
Bangladesh (datasheet/108369)	Present		Native			Ga (da DD
Bhutan (datasheet/108383)	Present		Native			Se (19 (da DD
China (datasheet/108398)	Present		Native			CA (da DD
-Anhui (datasheet/108667)	Present		Native			Li (da DD
-Fujian (datasheet/108670)	Present		Native			Lö (da DD al. (da DD

Continent/Country/Region	Distribution	Last Reported	Origin	First Reported	Invasive	Re
-Guangdong (datasheet/108671)	Present		Native			Lö (da DD al. (da DD
-Guangxi (datasheet/108673)	Present		Native			Lö (da DD al. (da DD
-Hainan (datasheet/108675)	Present		Native			Lö (da DD Ma (da DD al. (da DD al. (da DD
-Henan (datasheet/108680)	Present		Native			Lö (da DD al. (da DD
-Hubei (datasheet/108676)	Present		Native			Li (da DD
-Hunan (datasheet/108681)	Present		Native			Li (da DD

Continent/Country/Region	Distribution	Last Reported	Origin	First Reported	Invasive	Re
-Inner Mongolia (datasheet/108687)	Present		Native			Li (da DD
-Jiangsu (datasheet/108683)	Present		Native			Li (da DD
-Shaanxi (datasheet/108694)	Present		Native			Lö (da DD al. (da DD
-Shanxi (datasheet/108693)	Present		Native			Lö (da DD al. (da DD
-Sichuan (datasheet/108691)	Present		Native			Li (da DD
-Yunnan (datasheet/108698)	Present		Native			Lö (da DD al. (da DD
-Zhejiang (datasheet/108699)	Present		Native			Li (da DD

Continent/Country/Region	Distribution	Last Reported	Origin	First Reported	Invasive	Re
Hong Kong (datasheet/108678)	Present		Native			Lö (da DD al. (da DD
India (datasheet/108459)	Present		Native			CA (da DD
-Andaman and Nicobar Islands (datasheet/108720)	Present		Native			DU (da DD an (da DD Ma (da DD
-Andhra Pradesh (datasheet/108721)	Present		Native			Ste (da DD an (da DD (20 (da DD
-Arunachal Pradesh (datasheet/108722)	Present		Native			Se (19 (da DD (20 (da DD

Continent/Country/Region	Distribution	Last Reported	Origin	First Reported	Invasive	Re
-Assam (datasheet/108723)	Present		Native			DU (da DD an (da DD (20 (da DD (20 (da DD
-Bihar (datasheet/108724)	Present		Native			DU (da DD an (da DD
-Goa (datasheet/108731)	Present					Na (da DD
-Himachal Pradesh (datasheet/108733)	Present		Native			Ta (da DD Sn (da DD (20 (da DD

Continent/Country/Region	Distribution	Last Reported	Origin	First Reported	Invasive	Re
-Jammu and Kashmir (datasheet/108736)	Present		Native			DU (da DD an (da DD (20 (da DD
-Karnataka (datasheet/108738)	Present		Native			DU (da DD an (da DD
-Madhya Pradesh (datasheet/108743)	Present		Native			Se (19 (da DD (20 (da DD
-Maharashtra (datasheet/108740)	Present		Native			Ga (da DD (19 (da DD an (da DD (da DD (20 (da DD

Continent/Country/Region	Distribution	Last Reported	Origin	First Reported	Invasive	Re
-Nagaland (datasheet/108745)	Present		Native			Mi (da DD (20 (da DD
-Odisha (datasheet/108746)	Present		Native			DU (da DD an (da DD
-Punjab (datasheet/108748)	Present		Native			DU (da DD an (da DD (20 (da DD
-Rajasthan (datasheet/108749)	Present		Native			Ta (da DD
-Sikkim (datasheet/108750)	Present		Native			Lö (da DD (20 (da DD

Continent/Country/Region	Distribution	Last Reported	Origin	First Reported	Invasive	Re
-Tamil Nadu (datasheet/108751)	Present		Native			DU (da DD an (da DD (20 (da DD
-Uttar Pradesh (datasheet/108753)	Present		Native			Ste (da DD (19 (da DD an (da DD
-Uttarakhand (datasheet/108754)	Present		Native			Mu (da DD (20 (da DD
-West Bengal (datasheet/108755)	Present		Native			DU (da DD an (da DD
Indonesia (datasheet/108455)	Present		Native			Kh (da DD (20 (da DD

Continent/Country/Region	Distribution	Last Reported	Origin	First Reported	Invasive	Re
Laos (datasheet/108481)	Present		Native			Kh (da DD (20 (da DD
Malaysia (datasheet/108514)	Present		Native			DU (da DD Ma (da DD (20 (da DD
-Sarawak (datasheet/108767)	Present		Native			Vit (da DD
Myanmar (datasheet/108503)	Present		Native			Ga (da DD (19 (da DD Ma (da DD
Pakistan (datasheet/108537)	Present		Native			Se (19 (da DD Sn (da DD (20 (da DD

Continent/Country/Region	Distribution	Last Reported	Origin	First Reported	Invasive	Refe
Philippines (datasheet/108535)	Present		Native			DUFI (data DDB-
Sri Lanka (datasheet/108485)	Present		Native			Gaha (data DDB- (1968 (data DDB- Maiti (data DDB- al. (2((data DDB- (2016 (data DDB-
Thailand (datasheet/108580)	Present		Native			Gaha (data DDB- Maiti (data DDB- (2016 (data DDB-
Vietnam (datasheet/108604)	Present		Native			DUFI (data DDB- (2014 (data DDB-

History of Introduction and Spread

There are no documented cases of *T. holosericeus* becoming established in countries outside its native range as of 2019.

Risk of Introduction

Even though *T. holosericeus* has apparently not yet become established outside its native range, it could be moved internationally in large live plants, recently cut logs and milled lumber and solid wood packaging, all of which are known pathways for the inadvertent movement of cerambycids internationally (Haack, 2006 (datasheetreport/3428#5a4a5d1a-a613-4069-a51a-cafe557ea6f5); Cocquempot and Lindelöw, 2010 (datasheetreport/3428#bc5e893f-068f-4758-b919-f08a86fbcefa); Haack et al., 2010 (datasheetreport/3428#2f497c03-34b9-462a-82bc-d3fa32f51449); Eyre and Haack, 2017 (datasheetreport/3428#5f2920d4-6e08-445f-97a7-c32f38d0d85f); Meurisse et al., 2019 (datasheetreport/3428#5624d580-1695-4872-a116-698dde6c03bc)). Cerambycids are the second most commonly intercepted family of wood-infesting insects in solid wood packaging materials used in international trade (Haack, 2006 (datasheetreport/3428#5a4a5d1a-a613-4069-a51a-cafe557ea6f5); Haack et al., 2014 (datasheetreport/3428#51576599-1703-4e55-8d06-0660c94edd71)). During 1984-2008, there were 3483 interceptions of Cerambycidae associated with wood packaging at ports of entry in the United States (Haack et al., 2014 (datasheetreport/3428#51576599-1703-4e55-8d06-0660c94edd71)), including two interceptions of unidentified species of *Aeolesthes*, one from India and one from China. Given its wide host range, ability to infest both living and recently dead trees, and its adaptability to both moist and dry forests, *T. holosericeus* has the potential to become established in many countries worldwide, especially in the tropics and subtropics. Although *T. holosericeus* is seldom mentioned by name as a quarantine pest, many countries, such as the United States, take regulatory action against all interceptions of live Cerambycidae in wood packaging (USDA APHIS 2016 (datasheetreport/3428#dc2b4fad-7420-4f20-9c8d-46e71846e952)). In a recent pest risk assessment for exotic forest insects and pathogens that could negatively impact Hawaii’s forest trees (DeNitto et al., 2015 (datasheetreport/3428#412c4156-ae63-4d2a-8c63-e3c2279cfcc3)), *T. holosericeus* was evaluated and classified as a potential high-risk pest given that it had a high likelihood of introduction and, if established, would have high negative economic and environmental consequences.

Habitat

Trirachys holosericeus is primarily a forest pest of both natural and plantation forests, as well as fruit tree orchards. It occurs from sea level, where it has been reported as a pest of mangroves (Tiwari et al., 1980 (datasheetreport/3428#d392e682-db6e-4146-aff4-8d246199feef)), to sub-montane valleys of the Himalayas (Beeson, 1941). It occurs in both moist and dry forests (Beeson, 1941), and has been collected up to elevations of about 2500 m in the Punjab region of India (Rahman and Khan 1942). Little information was found on its pest status in urban areas; however, given its wide host range and ability to infest live trees it would seem that *T. holosericeus* has the potential to be an urban pest as well as a forest pest.

Habitat List

Category	Sub-Category	Habitat	Presence	Status
Terrestrial	Terrestrial – Managed	Managed forests, plantations and orchards	Principal habitat	Harmful (pest or invasive)
		Managed forests, plantations and orchards	Principal habitat	Natural
	Terrestrial - Natural / Semi-natural	Natural forests	Principal habitat	Harmful (pest or invasive)
		Natural forests	Principal habitat	Natural
Littoral		Mangroves	Principal habitat	Harmful (pest or invasive)
		Mangroves	Principal habitat	Natural

Hosts/Species Affected

At least 68 species of trees have been reported as larval hosts for *T. holosericeus* (Stebbing, 1914; Beeson, 1919; 1941; Rahman and Khan, 1942; Duffy, 1968; Tiwari et al., 1980 (datasheetreport/3428#d392e682-db6e-4146-aff4-8d246199feef); Ahmed et al., 2004 (datasheetreport/3428#c1995488-5880-4cee-8662-5bd35ec41999); Mamlayya et al., 2009 (datasheetreport/3428#d5033e49-d4af-40a6-8626-431631851784); Prakash et al., 2010 (datasheetreport/3428#889cf6a6-7e38-47d0-9a7c-ef14b20b29ec); Bhawane and Mamlayya, 2013 (datasheetreport/3428#3E90B2EA-8A92-4367-9E84-192F89E3596B); Gupta and Tara, 2013 (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0); Mitra, 2013 (datasheetreport/3428#0a74a302-3d5f-4fda-86e5-d83b225eed35); Salve, 2012 (datasheetreport/3428#2a202771-3534-4bbd-a1cb-044769bafb0e); 2014; Bhawane et al., 2015 (datasheetreport/3428#2907da9e-b360-469c-8f65-69f166e916cf); Kariyanna et al., 2017 (datasheetreport/3428#7ef7fb09-3642-445d-9ebf-cc11ef2edf3d); Sundararaj et al., 2019 (datasheetreport/3428#6052a9ed-f36a-407f-b392-069cfc2e7bcd)). All of these host trees are broadleaf trees (dicots) except one conifer, *Pinus roxburghii* (Beeson, 1919), which should be reconfirmed. Many of these host trees are important commercially for products such as timber, fruit, fibre and chemical extractives, as well as ornamentals. In addition, several of these trees (e.g., species of *Morus*, *Shorea* and *Terminalia*) are also important as the food plants for various silk moth larvae used in silk production.

Host Plants and Other Plants Affected

Plant name	Family	Context
Acacia chundra (datasheet/2188)	Fabaceae	Wild host
Acacia nilotica (gum arabic tree) (datasheet/2342)	Fabaceae	Wild host
Aegle marmelos (golden apple) (datasheet/3377)	Rutaceae	Wild host
Albizia lebbeck (Indian siris) (datasheet/4008)	Fabaceae	Wild host
Albizia procera (white siris) (datasheet/4021)	Fabaceae	Wild host
Albizia saman (rain tree) (datasheet/4026)	Fabaceae	Wild host
Alnus nitida (West Himalayan alder) (datasheet/4588)	Betulaceae	Wild host
Anogeissus latifolia (axle-wood tree) (datasheet/5357)	Combretaceae	Wild host
Artocarpus hirsutus (wild jack fruit) (datasheet/1833)	Moraceae	Wild host
Azadirachta indica (neem tree) (datasheet/8112)	Meliaceae	Wild host
Bauhinia acuminata (datasheet/8594)	Fabaceae	Wild host
Bauhinia semla (semla) (datasheet/8644)	Fabaceae	Wild host
Bauhinia variegata (mountain ebony) (datasheet/8656)	Fabaceae	Wild host
Bombax ceiba (silk cotton tree) (datasheet/9499)	Bombacaceae	Wild host
Bombax valetonii (datasheet/9502)	Bombacaceae	Unknown
Bridelia retusa (datasheet/9996)	Euphorbiaceae	Wild host
Butea monosperma (flame of the forest) (datasheet/10457)	Fabaceae	Wild host
Careya arborea (tummy wood) (datasheet/16018)	Lecythidaceae	Wild host
Chloroxylon swietenia (satinwood) (datasheet/12963)	Rutaceae	Wild host

Plant name	Family	Context
Cynometra ramiflora (datasheet/17476)	Fabaceae	Wild host
Desmodium oojeinense (datasheet/38105)	Fabaceae	Wild host
Dipterocarpus (datasheet/19706)	Dipterocarpaceae	Wild host
Dracontomelon dao (Argus pheasant tree) (datasheet/19767)	Anacardiaceae	Wild host
Duabanga grandiflora (datasheet/20128)	Sonneratiaceae	Wild host
Eucalyptus robusta (swamp mahogany) (datasheet/22843)	Myrtaceae	Wild host
Excoecaria agallocha (datasheet/23668)	Euphorbiaceae	Wild host
Ficus benghalensis (banyan) (datasheet/24066)	Moraceae	Wild host
Grewia optiva (datasheet/25991)	Tiliaceae	Wild host
Hardwickia binata (datasheet/26505)	Fabaceae	Wild host
Juglans regia (walnut) (datasheet/29063)	Juglandaceae	Wild host
Kydia calycina (Kydia) (datasheet/29573)	Malvaceae	Wild host
Lagerstroemia parviflora (datasheet/29676)	Lythraceae	Wild host
Lannea coromandelica (datasheet/29790)	Anacardiaceae	Wild host
Mallotus philippensis (kamala tree) (datasheet/32309)	Euphorbiaceae	Wild host
Malus baccata (siberian crab apple) (datasheet/31947)	Rosaceae	Wild host
Malus domestica (apple) (datasheet/31964)	Rosaceae	Main
Mangifera indica (mango) (datasheet/34505)	Anacardiaceae	Main
Miliusa velutina (datasheet/34111)	Annonaceae	Wild host
Morus alba (mora) (datasheet/34816)	Moraceae	Wild host
Myristica andamanica (datasheet/35351)	Myristicaceae	Wild host

Plant name	Family	Context
Pinus roxburghii (chir pine) (datasheet/41703)	Pinaceae	Wild host
Prosopis cineraria (screw-bean) (datasheet/44431)	Fabaceae	Wild host
Prunus armeniaca (apricot) (datasheet/44249)	Rosaceae	Main
Prunus avium (sweet cherry) (datasheet/44250)	Rosaceae	Main
Prunus domestica (plum) (datasheet/44278)	Rosaceae	Main
Prunus dulcis (almond) (datasheet/44279)	Rosaceae	Main
Prunus persica (peach) (datasheet/44340)	Rosaceae	Main
Psidium guajava (guava) (datasheet/45141)	Myrtaceae	Wild host
Pterocarpus marsupium (andaman redwood) (datasheet/45424)	Fabaceae	Wild host
Pterospermum acerifolium		Wild host
Pyrus communis (European pear) (datasheet/46190)	Rosaceae	Main
Quercus incana		Wild host
Rhizophora apiculata (true mangrove) (datasheet/47504)	Rhizophoraceae	Wild host
Santalum album (Indian sandalwood) (datasheet/50389)	Santalaceae	Wild host
Shorea robusta (sal) (datasheet/49937)	Dipterocarpaceae	Wild host
Soymida febrifuga (datasheet/50772)	Meliaceae	Wild host
Tamarix aphylla (athel) (datasheet/52483)	Tamaricaceae	Wild host
Tectona grandis (teak) (datasheet/52899)	Lamiaceae	Wild host
Terminalia arjuna (arjun) (datasheet/53124)	Combretaceae	Wild host
Terminalia bellirica (beleric myrobalan) (datasheet/53133)	Combretaceae	Wild host
Terminalia catappa (Singapore almond) (datasheet/53143)	Combretaceae	Wild host

Plant name	Family	Context
Terminalia elliptica (laurel) (datasheet/53122)	Combretaceae	Wild host
Terminalia myriocarpa (datasheet/53174)	Combretaceae	Wild host
Toona ciliata (toon) (datasheet/54175)	Meliaceae	Wild host
Triadica sebifera (Chinese tallow tree) (datasheet/48351)	Euphorbiaceae	Wild host

Symptoms

Signs of *T. holosericeus* infestation include zig-zag irregular galleries, often with broadened areas, constructed on the sapwood surface by early larval instars and also galleries that enter deep into the sapwood and heartwood that are constructed by late larval instars. The pupal chamber is formed at the end of the larval gallery and is usually parallel to the axis of the tree trunk or branch. Frass is ejected from the galleries through small holes in the bark as the larvae tunnel. In heavily infested trees, frass can accumulate at the base of the tree. Upon emergence from the trees, adults chew oval exit holes through the bark, with those produced by males being 0.6-0.9 cm wide and those made by females being 0.8-1.1 cm wide (Sinha et al., 2011 (datasheetreport/3428#64ae4e6b-1070-4484-a969-e5d0478f059a)). Given that borer infestation can occur over multiple years until the host tree dies, the typical symptoms include wilted foliage followed by crown dieback and eventual tree death.

List of Symptoms/Signs

Sign	Life Stages	Type
Leaves / wilting		
Stems / dieback		
Stems / gummosis or resinosis		
Stems / ooze		
Stems / visible frass		
Whole plant / frass visible		
Whole plant / internal feeding		
Whole plant / plant dead; dieback		
Whole plant / wilt		

Biology and Ecology

Physiology and Phenology

The most detailed studies on the life history of *T. holosericeus* have been conducted in India, and therefore most of the data reported here is based on those studies. Timing of events in the life cycle of *T. holosericeus* vary widely given that the geographic range of this beetle extends from near the equator to about 30°N latitude, and from sea level to about 2500 m elevation. For example, Khan (1989) (datasheetreport/3428#37470750-73f0-47c6-816c-213e6e1e13cf) reported adult emergence during February and March in central India (Madhya Pradesh), whereas Stebbing (1914) reported emergence primarily in June and July in northern India (Uttar Pradesh and Uttarakhand). Also in northern India (Jammu Province), Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0) stated that adults are active during April to June. And finally, although no details on where the observations were made, adults were reported to emerge from March to May by Beeson (1941) and April to July by Rahman and Khan (1942).

Reports on the time required for *T. holosericeus* to complete a single generation vary widely, which is to be expected given its broad latitudinal range and ability to infest live trees and cut logs. The shortest generation times reported of only 8-15 months were for the Andaman Islands, which are located at 10° to 14°N latitude (Khan and Maiti, 1983 (datasheetreport/3428#8daf27d7-d4f2-4b00-93c9-281a6335a7f0)). Others, working in central and northern India, have reported generation times of 1 year (Khan, 1989 (datasheetreport/3428#37470750-73f0-47c6-816c-213e6e1e13cf)), 1-2 years (Beeson, 1941), 2 years (Wang, 2017 (datasheetreport/3428#76d8c9a2-558e-4bcc-9e76-3f14c2ca6a9e)), and 2-3 years (Rahman and Khan, 1942).

Reproductive Biology

Mating takes place on the host tree (Stebbing, 1914). Tara et al. (2009) (datasheetreport/3428#e2300177-fa8b-4c94-a39d-3a780ef87198) reported that mating starts within 2-3 days of emergence. By contrast, Sinha et al. (2011) (datasheetreport/3428#64ae4e6b-1070-4484-a969-e5d0478f059a) stated that males start to mate within 2 days post-emergence, compared with 6-8 days for females. No pheromones have been reported for *T. holosericeus*; however, known pheromones for all other Cerambycinae have all been male-produced aggregation pheromones (Millar and Hanks, 2017 (datasheetreport/3428#be53f048-4304-48e2-8f4f-9dad9617208e)). *T. holosericeus* females usually chew a small slit in the outer bark, often in bark cracks and crevices, and then deposit one or more eggs into the slit (Rahman and Khan, 1942; Sinha et al., 2011 (datasheetreport/3428#64ae4e6b-1070-4484-a969-e5d0478f059a); Gupta and Tara, 2013 (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0)). The number of eggs laid at a single site was reported as 1-5 eggs by Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0), 2-4 by Wang (2017) (datasheetreport/3428#76d8c9a2-558e-4bcc-9e76-3f14c2ca6a9e), and 4-8 by Rahman and Khan (1942). Sinha et al. (2011) (datasheetreport/3428#64ae4e6b-1070-4484-a969-e5d0478f059a) reported that females appeared to seal the bark slit afterwards by rubbing their ovipositor over the slit for 3-5 minutes. Under laboratory conditions, Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0) reported that *T. holosericeus* lifetime fecundity averaged 63 eggs per female with a range of 45-83. However, Rahman and Khan (1942) stated that one female laid 92 eggs in her lifetime, while others reported that some females can lay 200-300 eggs each (Beeson, 1941; Khan, 1989 (datasheetreport/3428#37470750-73f0-47c6-816c-213e6e1e13cf); Wang, 2017 (datasheetreport/3428#76d8c9a2-558e-4bcc-9e76-3f14c2ca6a9e)).

Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0) stated that eggs hatched in 9-12 days, with an average incubation period of 11 days. By contrast, egg hatch was reported to occur in 2-3 days by Khan (1989) (datasheetreport/3428#37470750-73f0-47c6-816c-213e6e1e13cf), 7-12 days by Rahman and Khan (1942), and 18-20 days by Sinha et al. (2011) (datasheetreport/3428#64ae4e6b-1070-4484-a969-e5d0478f059a).

Based on head capsule widths, Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0) estimated that *T. holosericeus* has seven larval instars. After hatching, first instar larvae tunnel directly through the bark and feed in the cambial region at the interface of the bark and wood, with later instars entering the sapwood and heartwood (Gupta and Tara, 2013 (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0)). The larval galleries in the cambial region form a zig-zag pattern and at various locations broaden out into wide cavities that score deeply into both the bark and outer sapwood (Stebbing, 1914; Beeson, 1941). Stebbing (1914) stated that the portion of the larval gallery constructed on the sapwood surface is about 30 cm long and that the cavities are about 7.5 cm wide. Larvae usually chew 2-4 holes through the bark at various locations during their tunneling and use these holes to eject some of their frass and wood shavings (Stebbing, 1914; Beeson, 1941; Gupta and Tara, 2013 (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0)). At times various tree exudates also drip from these frass-ejection holes (Rahman and Khan, 1942; Gupta and Tara, 2013 (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0)). Gupta and Sharma (2015) (datasheetreport/3428#65314deb-e086-4f3a-bfda-7b97fcd2d051) noted active expulsion of frass from infested trees from April through November, peaking during August to October. When larvae are about two-thirds developed they tunnel somewhat horizontally (to the tree’s axis) into the sapwood and possibly heartwood for a distance of 6-7.5 cm and then tunnel downward, parallel to the tree’s axis, for about the same distance to form the eventual pupal chamber (Stebbing, 1914; Beeson, 1941). Prior to pupation, the larva returns to the near the bark surface and chews an area that will be used by the eventual adult as their exit hole. The larva then returns to the end of the gallery where it seals itself inside by capping the entrance to the pupal chamber with wood shavings and a calcium carbonate substance regurgitated by the larva to form an operculum (Stebbing, 1914; Beeson, 1941; Haack et al., 2017 (datasheetreport/3428#8d6d871c-b92f-405e-9d22-681fbfb97487)).

Pupation typically occurs in autumn or spring, and lasts 1-3 months depending on local conditions (Rahman and Khan, 1942; Duffy, 1968). For example, Beeson (1941) stated that pupation usually occurs in October and lasts only 3 weeks, whereas Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0) reported pupation usually starts in September or October and lasts about 8 weeks. Under ambient conditions indoors, Sinha et al. (2011) (datasheetreport/3428#64ae4e6b-1070-4484-a969-e5d0478f059a) reported a 34-45 day pupation period. When pupation occurs in autumn the new adults remain in the pupal chambers until the following spring and then emerge from the tree.

Longevity

Under laboratory conditions, adult longevity averaged 16 days for females and 33 days for males (Gupta and Tara, 2013 (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0)).

Activity Patterns

Adults are mostly nocturnal and usually remain still in bark crevices or on the shady side of logs during the day (Beeson, 1941; Rahman and Khan, 1942). Adults feed on the bark of young twigs (Tara et al., 2009 (datasheetreport/3428#e2300177-fa8b-4c94-a39d-3a780ef87198); Sinha et al., 2011 (datasheetreport/3428#64ae4e6b-1070-4484-a969-e5d0478f059a); Gupta and Tara, 2013 (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0)), but not on foliage (Rahman and Khan, 1942).

Climate

Climate	Status	Description	Remark
A - Tropical/Megathermal climate	Preferred	Average temp. of coolest month > 18°C, > 1500mm precipitation annually	
Af - Tropical rainforest climate	Preferred	> 60mm precipitation per month	
Am - Tropical monsoon climate	Preferred	Tropical monsoon climate (< 60mm precipitation driest month but > (100 - [total annual precipitation(mm}/25]))	
B - Dry (arid and semi-arid)	Preferred	< 860mm precipitation annually	
BS - Steppe climate	Preferred	> 430mm and < 860mm annual precipitation	
C - Temperate/Mesothermal climate	Preferred	Average temp. of coldest month > 0°C and < 18°C, mean warmest month > 10°C	
Cs - Warm temperate climate with dry summer	Preferred	Warm average temp. > 10°C, Cold average temp. > 0°C, dry summers	
Cw - Warm temperate climate with dry winter	Preferred	Warm temperate climate with dry winter (Warm average temp. > 10°C, Cold average temp. > 0°C, dry winters)	
Cf - Warm temperate climate, wet all year	Preferred	Warm average temp. > 10°C, Cold average temp. > 0°C, wet all year	
D - Continental/Microthermal climate	Preferred	Continental/Microthermal climate (Average temp. of coldest month < 0°C, mean warmest month > 10°C)	
Ds - Continental climate with dry summer	Preferred	Continental climate with dry summer (Warm average temp. > 10°C, coldest month < 0°C, dry summers)	
Dw - Continental climate with dry winter	Preferred	Continental climate with dry winter (Warm average temp. > 10°C, coldest month < 0° C, dry winters)	

Natural enemies

Natural enemy	Type	Life stages	Specificity	References	Biological control in	Biological control on
Euurobracon triplagiata	Parasite	Larvae	not specific			
Iphiaulax immsi	Parasite	Larvae	not specific			

Notes on Natural Enemies

Few reports on the natural enemies of *T. holosericeus* have been published. For example, an unidentified species of ichneumonid wasp was reported as being reared from *T. holosericeus* (Stebbing, 1914), and similarly the braconid wasps *Euurobracon maculipennis* [*Euurobracon triplagiata*] (Chatterjee and Misra, 1974 (datasheetreport/3428#931caac1-b457-4b79-b293-1e85395dedd6); Haider, 2002 (datasheetreport/3428#28a57a44-b8e6-4452-9956-4c9732ea768f)) and *Iphiaulax immsi* (Beeson, 1941; Chatterjee and Misra, 1974 (datasheetreport/3428#931caac1-b457-4b79-b293-1e85395dedd6)).

Means of Movement and Dispersal

The dispersal capability of *T. holosericeus* adults has not been reported. However, for other cerambycid species that have been carefully studied, season-long natural dispersal has often exceeded 1 km (Haack et al. 2017 (datasheetreport/3428#8d6d871c-b92f-405e-9d22-681fbfb97487)). The most likely method for long-distance spread of *T. holosericeus* would be through accidental introduction of infested products (live plants, logs and lumber) and solid wood packaging such as dunnage, crating and pallets. Although the author of this datasheet is not aware of any published interception records of *T. holosericeus*, there were two interceptions of unidentified species of *Aeolesthes* (the genus to which *T. holosericeus* was assigned until 2018) in the dataset used by Haack et al. (2014) (datasheetreport/3428#51576599-1703-4e55-8d06-0660c94edd71), which included 3483 cerambycid interception records made at US ports-of-entry during 1984-2008. One of these interceptions was from India and the other was from China, which are both countries within the natural range of *T. holosericeus.*

Pathway Vectors

Vector	Notes	Long Distance	Local	References
Containers and packaging - wood (datasheet/109066)	Infrequently found as larvae in wood packaging	Yes	Yes	Haack et al., 2014; unpublished database
Plants or parts of plants (datasheet/107789)	All life stage, but mostly larva, pupa, and new adults	Yes	Yes	Beeson, 1941 (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0)

Plant Trade

Plant parts liable to carry the pest in trade/transport	Pest stages	Borne internally	Borne externally	Visibility of pest or symptoms
Stems (above ground)/Shoots/Trunks/Branches	adults; eggs; larvae; pupae	Yes	Yes	Pest or symptoms usually visible to the naked eye
Wood	adults; larvae; pupae	Yes		Pest or symptoms usually visible to the naked eye

Wood Packaging

Wood Packaging liable to carry the pest in trade/transport	Timber type	Used as packing
Solid wood packing material with bark	Primarily hardwoods	Yes
Solid wood packing material without bark	Primarily hardwoods	Yes

Impact Summary

Category	Impact
Cultural/amenity	Negative
Economic/livelihood	Negative
Environment (generally)	Negative

Economic Impact

Trirachys holosericeus is a major pest of both forest and orchard trees throughout South, East, and Southeast Asia, and especially in India given the large number of published scientific papers from that country. *T. holosericeus* has an extremely wide host range, almost exclusively hardwood species, and can infest apparently healthy trees as well as stressed trees and recently cut logs. Tree mortality can occur in a single season, but usually several successive years of infestation are required before trees are killed.

In logging operations and at sawmills, Stebbing (1914) stated that 20-60% of stored logs could be infested by *T. holosericeus*, and similarly Khan (1989) (datasheetreport/3428#37470750-73f0-47c6-816c-213e6e1e13cf) stated that 40-60% of stored logs could be infested. The quality of lumber cut from infested logs is greatly reduced because of the large galleries that reach deep into the heartwood of the tree (Stebbing, 1914; Beeson, 1941; Khan and Maiti, 1983 (datasheetreport/3428#8daf27d7-d4f2-4b00-93c9-281a6335a7f0)). In apple orchards, Gupta and Tara (2014) (datasheetreport/3428#cd679ce6-55a2-4705-9c95-0abed6a8ac1b) and Gupta and Sharma (2015) (datasheetreport/3428#65314deb-e086-4f3a-bfda-7b97fcd2d051) reported infestation levels could reach as high as 40% of all trees in an orchard. Gupta and Tara (2013) (datasheetreport/3428#93db163b-80d3-40c2-b9b4-99411c392eb0) noted that larval densities can be as high as 65-70 larvae in a single branch of an apple tree. In plantations of *Terminalia arjuna* trees, where foliage is collected to feed to silkworms (Lepidoptera: Saturniidae) used to produce tasar silk, Prakash et al. (2010) (datasheetreport/3428#889cf6a6-7e38-47d0-9a7c-ef14b20b29ec) reported infestation levels of individual trees as high as 59%. Similarly, Singh et al. (1987) (datasheetreport/3428#bbb3c019-9241-4d79-a192-994ea2ebe2f4) reported infestation rates as high as 24% for *Terminalia arjuna* trees and 39% for *Terminalia tomentosa* [*Terminalia elliptica*] trees growing in plantations maintained for tasar silk production. Besides *T. holosericeus*, there are many other insect borers that attack trees used in tasar culture, including the buprestid beetle *Sphenoptera cupriventris* [*Sphenoptera barbarica*] and the cossid moth *Indarbela quadrinotata* (Reddy et al., 1996 (datasheetreport/3428#96c08d0b-b1d0-4957-9879-ecb8c82209a8); Tirkey et al., 2019 (datasheetreport/3428#a6421d5b-8f38-41b1-90f0-a9c568687f19)).

Environmental Impact

Given the broad host range of *T. holosericeus* and its ability to infest apparently healthy trees, stressed trees, and recently cut logs, it is likely that this beetle could cause great environmental damage wherever it becomes established. For these reasons and others, DeNitto et al. (2015) (datasheetreport/3428#412c4156-ae63-4d2a-8c63-e3c2279cfcc3) classified *T. holosericeus* as a high-risk pest to the forests of Hawai'i, and especially to the Hawaiian endemic tree species *Acacia koa*.

Social Impact

Given the large numbers of people involved in tasar silk production, especially in rural areas of India (Singh et al., 1985 (datasheetreport/3428#6334534b-8e4b-4307-9d8a-710fd6dd3b24); Gangopadhyay, 2010 (datasheetreport/3428#05657b14-4f91-4800-b6fa-6ace3e8c0274); Reddy, 2010 (datasheetreport/3428#614a9a3a-c517-4611-aa3b-a8e81584111b)), outbreaks of *T. holosericeus* can greatly impact local economies by weakening or killing the trees used to supply foliage to the silkworm caterpillars. Similarly, outbreaks of *T. holosericeus* in areas of high fruit production can reduce yields in the affected orchards and thereby impact farm economies.

Risk and Impact Factors

Invasiveness

- Has a broad native range
- Abundant in its native range
- Highly adaptable to different environments
- Is a habitat generalist
- Capable of securing and ingesting a wide range of food

Impact outcomes

- Host damage
- Negatively impacts agriculture
- Negatively impacts forestry
- Threat to/ loss of native species
- Damages animal/plant products

Impact mechanisms

- Herbivory/grazing/browsing

Likelihood of entry/control

- Highly likely to be transported internationally accidentally
- Difficult to identify/detect as a commodity contaminant
- Difficult to identify/detect in the field
- Difficult/costly to control

Detection and Inspection

The most obvious signs of active *T. holosericeus* infestation on standing trees would be detection of frass being expelled from infested branch and trunk sections or piled at the base of the tree. Frass would also be obvious on cut logs that are currently infested. The characteristic larval galleries of *T. holosericeus* would be present under the bark where frass has been expelled from the tree. Note that frass is generally not expelled during the colder winter months and at times it can be washed away by heavy rains. In addition, various life stages of *T. holosericeus* would be present within the galleries if the infestation is active. If all individuals have become adults and exited the tree, then exit holes made by the adults and empty larval galleries would be present. Although no pheromone has yet been identified for *T. holosericeus*, detection surveys using traps baited with multiple known pheromones of other Cerambycinae could be tested in the field now (Millar and Hanks, 2017 (datasheetreport/3428#be53f048-4304-48e2-8f4f-9dad9617208e)), and improved upon once the actual pheromone of *T. holosericeus* is discovered. In a recent trapping study in Italy, for example, Rassati et al. (2019) (datasheetreport/3428#d9c7776e-9247-4961-9934-64881fb71045) showed that more Cerambycinae species were collected in purple multiple-funnel traps (vs. green), baited with multiple cerambycid pheromones (vs. ethanol alone), and suspended in the canopy of trees (vs. in the understory).

Similarities to Other Species/Conditions

There are many similarities between adults of *T. holosericeus* and adults of other species of the genera *Trirachys* and *Aeolesthes.* The keys and characters given in Vitali et al. (2017) (datasheetreport/3428#e16fc400-768f-40e8-966b-d38108dd2e9a) will be helpful in distinguishing among the species, but confirmation by experts would be recommended. As for the larvae, Duffy (1968) reports that *T. holosericeus* larvae are very similar to those of the Cerambycinae species *Hoplocerambyx spinicornis* in general shape and size as well as gallery pattern. In addition, these two cerambycids have broadly similar geographic ranges and many host trees in common, such as species of *Duabanga, Pentacme,* and *Shorea,* and therefore both species can be found in the same tree or log. Although the larvae of these two species are similar, Gardner (1925) and Duffy (1968) point out several differences, and Gardner (1925) also provides a key to the larvae of the common Cerambycinae in India.

DNA barcoding could be used to positively identify *T. holosericeus* at all life stages, especially larvae and pupae, encountered in trees or traded products such as nursery stock, logs, lumber, and wood packaging. Wu et al. (2017) (datasheetreport/3428#c0fa6854-a025-46e0-8c70-1edcf7600a74) showed the value of this DNA technique for several buprestid and cerambycid borers collected from solid wood packaging. Barcode of Life Data Systems (BOLDS) is a public online reference library of DNA barcode data for tens of thousands of plant and animal species worldwide (BOLDS, 2019 (datasheetreport/3428#1254944c-ae6a-4c08-b704-148b7336dff3)). As of 2019, DNA barcode data are available in BOLDS for *T. holosericeus* (currently listed as *Aeolesthes holosericea*), as well as three other species of *Aeolesthes, Hoplocerambyx spinicornis*, and nearly 2000 other cerambycid species.

Prevention and Control

Chemical Control

For logs that cannot be debarked or milled quickly, various insecticides can be applied to the bark surface of logs while in storage (Khan, 1989 (datasheetreport/3428#37470750-73f0-47c6-816c-213e6e1e13cf)). For infested live trees, such as fruit trees, several insecticides have shown good results when applied by inserting insecticide-soaked cotton plugs into the galleries and sealing the area with mud (Sharma and Attri, 1969; Mandal et al., 1989 (datasheetreport/3428#ae4cad14-d488-48d6-b826-df6b785952d9); Gupta and Tara, 2014 (datasheetreport/3428#cd679ce6-55a2-4705-9c95-0abed6a8ac1b)). Similar techniques have shown good control of the related cerambycid *Aeolesthes sarta* (Gaffar and Bhat, 1991 (datasheetreport/3428#78e45b81-fc6b-443a-b877-1e5b94269cab)).

Cultural control and sanitary measures

For forestry situations, logging during the colder months when *T. holosericeus* adults are not active and promptly moving and milling the logs would reduce opportunities for infestation. Alternatively, debarking logs in the field or when in storage would prevent oviposition. Debarking should be done before adult emergence begins in spring, such as by March or April, to avoid oviposition (Stebbing, 1914; Beeson, 1941; Khan, 1989 (datasheetreport/3428#37470750-73f0-47c6-816c-213e6e1e13cf)). Stand sanitation after logging, such as chipping or burning of larger branches, would eliminate some breeding sites. Currently infested trees could also be targeted for cutting and burning during logging operations to lower beetle populations (Stebbing, 1914; Beeson 1941). Khan (1989) (datasheetreport/3428#37470750-73f0-47c6-816c-213e6e1e13cf) found that logs stored in full sunlight had lower infestation rates compared with logs held in shady areas.

Physical/mechanical control

In the insecticide study reported above by Gupta and Tara (2014) (datasheetreport/3428#cd679ce6-55a2-4705-9c95-0abed6a8ac1b), simply sealing the galleries with mud resulted in 10-11% larval mortality. In many countries, simply inserting a flexible wire into the larval gallery and attempting to injure the feeding larvae has shown good efficacy in controlling many cerambycid species (Rahman and Khan, 1942; Duffy, 1968; Wang, 2017 (datasheetreport/3428#76d8c9a2-558e-4bcc-9e76-3f14c2ca6a9e)).

Biological control

No reports were found on efforts to control *T. holosericeus* with natural enemies.

Gaps in Knowledge/Research Needs

At time of writing in 2019, no information was found on *T. holosericeus* pheromones or long-distance dispersal, either as a single flight event or season-long spread. Similarly, no information was found on the minimum diameter of tree trunks or branches that are suitable for *T. holosericeus* oviposition. No detailed information was found on the pest status of *T. holosericeus* in urban areas or on ornamentals. For trees from which foliage is collected for tasar silk production, there was no information found on how the seasonality or degree of defoliation affects subsequent tree susceptibility to *T. holosericeus* infestation. Lastly, the early reports that the conifer *Pinus roxburghii* is a larval host of *T. holosericeus* should be confirmed.

References

Ahmed, S. I., Chaudhuri, K. K., Meeta Sharma, Shivesh Kumar, 2004. New insect pest records of Khejri and Rohida from Rajasthan and their possible management strategies. Indian Forester, 130(12), 1361-1374. (abstract/20053124597)

BEESON, C. F. C. , 1934. Indian Forester, Calcutta.539-543 pp. (abstract/19360500228)

BEESON, C. F. C. , 1941. The ecology and control of the forest insects of India and the neighbouring countries, Dehra Dun, The Author.5+] ii+1007 pp. (abstract/19430500298)

BEESON, C. P. C. , 1919. The Food Plants of Indian Forest Insects. Paris I and II. Indian Forester, 45 (2-3), 49-56; 139-153. (abstract/19190500579)

Bhawane GP, Mamlayya AB, 2013. Artocarpus hirsutus (Rosales: Moraceae): anew larval food plant of Aeolesthes holosericea (Coleoptera: Cerambycidae). Florida Entomologist, 96(1):274-277. http://www.fcla.edu/FlaEnt/ (abstract/20133167702)

Bhawane, G. P., Gaikwad, Y. B., Gaikwad, S. M., Mamlayya, A. B., 2015. Longicorn beetles and their diet breadth from forests of Kolhapur district, Northern Western Ghats, Maharashtra. The Bioscan, 10 (2), 679-684. http://www.thebioscan.in/Journals_PDF/10238%20G.%20P.%20BHAWANE.pdf (abstract/20153338728)

BOLDS, 2019. Kingdoms of Life being barcoded. In: Kingdoms of Life being barcoded : BOLD Systems.http://www.boldsystems.org/index.php/TaxBrowser_Home (abstract/20177200284)

Chatterjee, P. N., Misra, M. P., 1974. Natural insect enemy and plant host complex of forest insect pests of Indian region. In: Indian Forest Bulletin , (No. 265) . 233 pp. (abstract/19750625313)

Cocquempot, C., Lindelöw, Ǻ., 2010. Longhorn beetles (Coleoptera, Cerambycidae). BIORISK - Biodiversity and Ecosystem Risk Assessment, (No.4), 193-218. http://pensoftonline.net/biorisk/index.php/journal/article/view/56/57 (abstract/20113081993)

DeNitto, G. A., Cannon, P., Eglitis, A., Glaeser, J. A., Maffei, H., Smith, S., 2015. General Technical Report - Pacific Southwest Research Station, USDA Forest Service, Berkeley, USA: Pacific Southwest Research Station, USDA Forest Service (No.PSW-GTR-250), 171 pp. http://www.fs.fed.us/psw/publications/documents/psw_gtr250/psw_gtr250.pdf (abstract/20163017076)

DUFFY, E. A. J., 1968. A monograph of the immature stages of oriental timber beetles (Cerambycidae), London, Br. Mus. (Nat. Hist.).7+] 434 pp. (abstract/19680501549)

Eyre D, Haack RA, 2017. Invasive Cerambycid pests and biosecurity measures. In: Cerambycidae of the world: biology and pest management, [ed. by Wang Q]. Boca Raton, Florida, USA: CRC Press. 563 –607.

Fabricius, J. C., 1787. Mantissa insectorum sistens eorum species nuper detectas adjectis C aracteribus genericis, differentiis specificis, emendationibus, observationibus, 2, Hafniae, 312 pp. (abstract/20057000043)

Gaffar, S. A., Bhat, A. A., 1991. Management of stem borer, Aeolesthes sarta (Solsky), infesting walnut trees in Kashmir. Indian Journal of Forestry, 14(2), 138-141. (abstract/19940601886)

Gahan CJ, 1890. Notes on longicorn Coleoptera of the group Cerambyciae, with descriptions of new genera and species. The Annals and Magazine of Natural History, 6(32), 247–261.

Gahan CJ, 1891. Notes on longicorn Coleoptera of the group Cerambyciae, with descriptions of new genera and species. The Annals and Magazine of Natural History, 7(37), 19-34.

Gahan, C. J., 1906. The Fauna of British India, including Ceylon and Burma. Coleoptera, Vol. 1 (Cerambycidae), London, UK: Taylor and Francis. (abstract/20057001075)

Gangopadhyay D, 2010. Sericulture industry in India – a review. India Science and Technology (Online), https://ssrn.com/abstract=1473049 (https://ssrn.com/abstract=1473049)

GARDNER, J. C. M. , 1925. Identification of Immature Stages of Indian Cerambycidae. I. Cerambycini. Indian Forest Records, 12(pt. 2), 89]-[105] pp. (abstract/19260500371)

Gupta R, Sharma R, 2015. Seasonal incidence of Aeolesthes holosericea Fabricius (Coleoptera: Cerambycidae) on apple plantations (Malus domestica Borkh.) and it's relation with important weather factors in Jammu Province, India. International Journal of Advanced Biological Research, 5(3), 216-219.

Gupta R, Tara JS, 2014. Management of apple tree borer, Aeolesthes holosericea Fabricius on apple trees (Malus domestica Borkh.) in Jammu Province, Jammu and Kashmir State, India. Journal of Entomology and Zoology Studies, 2(1), 96-98.

Haack RA, Keena MA, Eyre D, 2017. Life history and population dynamics of Cerambycidae. In: Cerambycidae of the world: biology and pest management, [ed. by Wang Q]. Boca Raton, Florida, USA: CRC Press. 71-103.

Haack, R. A., 2006. Exotic bark- and wood-boring Coleoptera in the United States: recent establishments and interceptions. Canadian Journal of Forest Research, 36(2), 269-288. doi: 10.1139/x05-249 (abstract/20063135312)

Haack, R. A., Britton, K. O., Brockerhoff, E. G., Cavey, J. F., Garrett, L. J., Kimberley, M., Lowenstein, F., Nuding, A., Olson, L. J., Turner, J., Vasilaky, K. N., 2014. Effectiveness of the international phytosanitary standard ISPM No. 15 on reducing wood borer infestation rates in wood packaging material entering the United States. PLoS ONE, 9(5), e96611. http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0096611 doi: 10.1371/journal.pone.0096611 (abstract/20143246107)

Haack, R. A., Hérard, F., Sun, J. H., Turgeon, J. J., 2010. Managing invasive populations of Asian longhorned beetle and citrus longhorned beetle: a worldwide perspective. Annual Review of Entomology, 55, 521-546. http://www.annualreviews.org/doi/abs/10.1146/annurev-ento-112408-085427 doi: 10.1146/annurev-ento-112408-085427 (abstract/20113116822)

Haider AA, 2002. Taxonomy of Indian Braconidae (Braconinae, Euphorinae and Hormiinae). DPhil Thesis. Aligarh, India: Aligarh Muslim University. 125 pp.

Hope, F. W., 1843. Descriptions of the coleopterous insects sent to England by Dr. Cantor from Chusan and Canton, with observations on the entomology of China. Annals and Magazine of Natural History, 11, 62-66. (abstract/20057000153)

Jiji, T., Anitha, N., Aswathy Asokan, Akhila, G. V., 2016. Diversity of long horned beetle (Coleoptera: Cerambycidae) pests in southern Kerala. Pest Management in Horticultural Ecosystems, 22(1), 40-44. http://aapmhe.in/index.php/pmhe/article/view/702/655 (abstract/20173280935)

Kariyanna B, 2016. An analysis of the species diversity and distribution of agriculturally important longhorn beetles (Cerambycidae: Coleoptera) from India. M.Sc. Thesis. Raipur, Chhattisgarh, India: Indira Gandhi Krishi Vishvavidyalaya. 774 pp.

Kariyanna B, Gupta R, Bakthavatchalam N, Mohan M, Nithish A, Dinkar NK, 2017. Host plants record and distribution status of agriculturally important longhorn beetles (Coleoptera: Cerambycidae) from India. Progressive Research–An International Journal, 12(1), 1195-1199.

Kariyanna B, Mohan M, Gupta R, Murali S, 2018. Longhorn beetles (Cerambycidae: Coleoptera) of Bihar, India. International Journal of Current Microbiology and Applied Sciences, Special Issue 7, 576-583.

Khan, H. R., 1989. Entomological studies on freshly felled wood borer Aeolesthes holosericea Fab. and its control in Madhya Pradesh. Indian Journal of Forestry, 12(2), 101-105. (abstract/19910653178)

Khan, T. N., Maiti, P. K., 1983. Studies on the biotaxonomy, biology and ecology of some longicorn beetle borers (Coleoptera: Cerambycidae) of the Islands of Andaman, India. In: Occasional Paper, Records of the Zoological Survey of India , (No. 45) . 102 pp. (abstract/19850528975)

Li LiYing, Wang Ren, Waterhouse, D. F., 1997. The distribution and importance of arthropod pests and weeds of agriculture and forestry plantations in southern China. In: The distribution and importance of arthropod pests and weeds of agriculture and forestry plantations in southern China . Canberra, Australia: Australian Centre for International Agricultural Research (ACIAR).x + 185 pp. (abstract/19981100046)

Löbl I, Smetana A, 2010. Catalogue of Palaearctic Coleoptera, Chrysomeloidae. Volume 6, Stenstrup, Denmark: Apollo Books.924 pp.

Makihara, H., Mannakkara, A., Fujimura, T., Ohtake, A., 2008. Checklist of longicorn coleoptera of Sri Lanka (1) Vesperidae and Cerambycidae excluding Lamiinae. Bulletin of the Forestry and Forest Products Research Institute, Ibaraki, (No.407), 95-110. http://ss.ffpri.affrc.go.jp/labs/kanko/407-3.pdf (abstract/20093007448)

Mamlayya AB, 2011. Studies on insect pests of economically important forest trees from Kolhapur District. DPhil Thesis. Kolhapur, India: Shivaji University. 280 pp.

Mamlayya, A. B., Aland, S. R., Gaikwad, S. M., Bhawane, G. P., 2009. Incidence of a beetle Aeolesthes holosericea on Samanea saman and Albizia lebbeck trees at Kolhapur, Maharashtra. Bionotes, 11(4), 133. (abstract/20103050433)

Mandal, K. C., Singh, R. N., Bhengra, S. R., Dhar, S. L., Sinha, S. S., Sengupta, K., 1989. Control measure of round headed stem borer Aeolesthes holosericea Fabr. (Cerambycidae: Coleoptera) in sericulture zones under tropical ecosystem. (Mesure de controle de l'insecte des tiges a tete ronde, Aeolesthes holosericea Fabr. (Cerambycidae: Coleoptera) dans les zones sericicoles sous climat tropical). Sericologia, 29(1), 135-140. (abstract/19896772564)

Meurisse, N., Rassati, D., Hurley, B. P., Brockerhoff, E. G., Haack, R. A., 2019. Common pathways by which non-native forest insects move internationally and domestically. Journal of Pest Science, 92(1), 13-27. http://rd.springer.com/journal/10340 doi: 10.1007/s10340-018-0990-0 (abstract/20193085759)

Millar JC, Hanks LM, 2017. Chemical ecology of cerambycids. In: Cerambycidae of the world: biology and pest management, [ed. by Wang Q]. Boca Raton, Florida, USA: CRC Press. 161-208.

Mitra B, 2013. Biological diversity of cerambycid beetles infesting forest plants in the Andaman & Nicobar Islands. DPhil Thesis. Santiniketan, India: Visva Bharti University. 205 pp.

Mitra B, Bhaumik S, Chakraborti U, Mallick K, 2017. An update on the diversity, distribution and zoo-geographical notes on longhorn beetles (Cerambycidae: Coleoptera) of North-East India. Biological Forum – an International Journal, 9(2), 61-80.

Mitra B, Chakraborti U, Mallick K, Bhaumik S, Das P, 2017. An updated list of cerambycid beetles (Coleoptera: Cerambycidae) of Assam, India. Record of the Zoological Survey of India, 117(1), 78-90.

Mitra B, Das P, Chakraborti U, Mallick K, Chakraborty K, 2016. Long horn beetles (Cerambycidae: Coleoptera) of Nagaland, India. Journal of Global Biosciences, 5(4), 3963-3969.

Mitra B, Majumder A, Chakraborti U, Das P, Mallick K, 2015. Longhorn beetles (Cerambycidae: Coleoptera) of Himachal Pradesh. Records of the Zoological Survey of India, 115(4), 405-409.

More SV, Prashant MS, Chandgadkar A, Surve J, 2017. Fauna of long horned beetle (Coleoptera: Cerambycidae) from Tilari forest, Chandgad, Kolhapur District of Maharashtra, a region of Western Ghats. Journal of Entomology and Zoology Studies, 5(6), 1684-1688.

Mukhopadhyay P, 2011. On a collection of Insecta: Coleopera: Cerambycidae and Curculionidae (Brachyderinae and Otiorrhynchinae) from Uttarakhand. Records of the Zoological Survey of India, 111 (2), 75-88.

Nga CTQ, Long KD, Thinh TH, 2014. New Records of the Tribe Cerambycini (Coleoptera: Cerambycidae: Cerambycinae) from Vietnam. Tap Chi Sinh Hoc (Academia Journal of Biology), 26(4), 428-443.

Prakash, P. J., Singh, R. S. J., Rao, B. V. S., Mahobia, G. P., Kumar, M. V., Prasad, B. C., 2010. Population dynamics of round headed stem borer, Aeolesthes holosericea Fabr. (Coleoptera: Cerambycidae) in arjun ecosystem of Andhra Pradesh and its correlation with abiotic factors. Entomon, 35(2), 143-146. (abstract/20113203446)

RAHMAN, K. A. , ABDUL WAHID KHAN., 1942. Bionomics and Control of Aeolesthes holosericea F. (Cerambycidae: Coleoptera). Proceedings of the National Academy of Sciences of India, Section B. Biological Sciences, 15(4), 181-185 pp. (abstract/19420500955)

Rassati, D., Marini, L., Marchioro, M., Rapuzzi, P., Magnani, G., Poloni, R., Giovanni, F. di, Mayo, P., Sweeney, J., 2019. Developing trapping protocols for wood-boring beetles associated with broadleaf trees. Journal of Pest Science, 92(1), 267-279. http://rd.springer.com/journal/10340 doi: 10.1007/s10340-018-0984-y (abstract/20193085778)

Reddy KJ, Ram GM, Singh MK, Singh RN, 1996. Stem borer in primary tasar food plants. (Indian Silk). 39(9), 35-38.

Reddy, R. M., 2010. Conservation need of tropical tasar silk insect, Antheraea mylitta Drury (Lepidoptera: Saturniidae) - strategies and impact. Journal of Entomology, 7(3), 152-159. http://scialert.net/qredirect.php?doi=je.2010.152.159&linkid=pdf doi: 10.3923/je.2010.152.159 (abstract/20103136847)

Ruchie Gupta, Tara, J. S., 2013. First record on the biology of Aeolesthes holosericea Fabricius, 1787 (Coleoptera: Cerambycidae), an important pest on apple plantations (Malus domestica Borkh.) in India. Munis Entomology & Zoology, 8(1), 243-251. http://www.munisentzool.org (abstract/20133099248)

Salve US, 2014. Neem, Azadirachta indica Juss. a new host plant of insect Aeolesthes holosericea Fabricius from Maharashtra, India. Online International Interdisciplinary Research Journal, 4(1):199-203. http://www.oiirj.org/oiirj/jan-feb2014/24.pdf (abstract/20143164671)

Salve, U. S., 2012. Study of Neem trees from Beed District (Maharashtra) affected by stem borers. Online International Interdisciplinary Research Journal, 2(6), 34-40. http://www.oiirj.org/oiirj/nov-dec2012/06.pdf (abstract/20133163724)

Sengupta, C. K., Sengupta, T., 1981. Cerambycidae (Coleoptera) of Arunachal Pradesh. Records of the Zoological Survey of India, 78(1/4), 133-154. (abstract/19850528973)

SHARMA, P. L., ATTRI, B. S., 1969. Control of apple stem borer, Aeolesthes holosericea Fabricius (Cerambycidae: Coleóptera). Indian Journal of Entomology, 31(1), 79-80. (abstract/19729500058)

Singh RN, Krishna Rao JV, Samson MV, 2001. Role of parasitoids in pest management in tasar culture. In: Biocontrol potential and its exploitation in sustainable agriculture, Volume 2, Insect pests, [ed. by Upadhaya RK, Mukerji KG, Chamola BP]. New York, USA: Kluwer Academy. 379-387.

Singh RN, Mandal KC, Dhar SL, Sengupta K, 1987. Studies on the biology and extent of damage by stem borer, Aeolesthes holosericea. Sericologia, 27(3), 541-546.

Singh, A. K., Singh, M. K., Mascarenhas, O. A. J., 1985. Community forestry for revitalising rural ecosystems: a case study. Forest Ecology and Management, 10(3), 209-232. doi: 10.1016/0378-1127(85)90116-1 (abstract/19850602896)

Sinha RB, Debnath AK, Singh BMK, Prasad BC, 2011. Laboratory culture of stem borer, Aeolesthes holosericea F., method developed. Nature Precedings, http://precedings.nature.com/documents/5640/version/1 (http://precedings.nature.com/documents/5640/version/1)

STEBBING, E. P. , 1914. Indian Forest insects of Economic Importance: Coleoptera, London, UK: Eyre & Spottiswoode, Ltd.xvi + 648 pp. (abstract/19150500305)

Sundararaj, R., Wilson, J. J., Vimala, D., 2019. Stem borers of Indian sandalwood (Santalum album Linn.) in Karnataka, India. Journal of the Indian Academy of Wood Science, 16(1), 31-35. doi: 10.1007/s13196-019-00232-1 (abstract/20193331260)

Tara, J. S., Ruchie Gupta, Monika Chhetry, 2009. A study on Aeolesthes holosericea Fabricius, an important pest of apple plantations (Malus domestica Borkh.) in Jammu region. Asian Journal of Animal Science, 3(2), 222-224. (abstract/20093102589)

Tirkey P, Chandrashekharaiah M, Rathore MS, Singh RK, Sinha RB, Sahay A, 2019. Studies on level of infestation of flat headed borer and bark eating caterpillar on Terminalia arjuna and their management using insecticides. International Journal of Current Microbiology and Applied Sciences, 8 (1)

Tiwari, K. K., Das, A. K., Roy, M. K. Dev, Khan, T. N., 1980. On the wood borers of mangroves of Andaman and Nicobar Islands, India, with a note on the gallery pattern of some insect borers. Records of the Zoological Survey of India, 77(1/4), 357-362. (abstract/19830599011)

USDA APHIS, 2016. APHIS adopts international standards on wood packaging materials. US Department of Agriculture, Animal and Plant Health Inspection Service.https://www.aphis.usda.gov/aphis/ourfocus/planthealth/import-information/wood-packaging-material/sa_hot_topics/ct_wood_packing (https://www.aphis.usda.gov/aphis/ourfocus/planthealth/import-information/wood-packaging-material/sa_hot_topics/ct_wood_packing)

Vitali F, Gouverneur X, Chemin G, 2017. Revision of the tribe Cerambycini: redefinition of the genera Trirachys Hope, 1843, Aeolesthes Gahan, 1890 and Pseudaeolesthes Plavilstshikov, 1931 (Coleoptera, Cerambycidae). Les Cahiers Magellanes, 26, 40-65.

Wang Q, 2017. Cerambycid pests in agricultural and horticultural crops. In: Cerambycidae of the world: biology and pest management, [ed. by Wang Q]. Boca Raton, Florida, USA: CRC Press. 409-562.

Wu Y, Trepanowski NF, Molongoski JJ, Reagel PF, Lingafelter SW, Nadel H, Myers SW, Ray AM, 2017. Identification of wood-boring beetles (Cerambycidae and Buprestidae) intercepted in trade-associated solid wood packaging material using DNA barcoding and morphology. Nature Scientific Reports, 7

Distribution References

CABI, 2020. CABI Distribution Database: Status inferred from regional distribution. Wallingford, UK: CABI

DUFFY E A J, 1968. A monograph of the immature stages of oriental timber beetles (Cerambycidae). London, Br. Mus. (Nat. Hist.). 7+] 434 pp. (abstract/19680501549)

Gahan C J, 1906. The Fauna of British India, including Ceylon and Burma. Coleoptera, Vol. 1 (Cerambycidae). London, UK: Taylor and Francis. (abstract/20057001075)

Kariyanna B, Mohan M, Gupta R, Murali S, 2018. Longhorn beetles (Cerambycidae: Coleoptera) of Bihar, India. International Journal of Current Microbiology and Applied Sciences, Special Issue 7. 576-583.

Khan T N, Maiti P K, 1983. Studies on the biotaxonomy, biology and ecology of some longicorn beetle borers (Coleoptera: Cerambycidae) of the Islands of Andaman, India. In: Occasional Paper, Records of the Zoological Survey of India, 102 pp. (abstract/19850528975)

Li LiYing, Wang Ren, Waterhouse D F, 1997. The distribution and importance of arthropod pests and weeds of agriculture and forestry plantations in southern China. In: The distribution and importance of arthropod pests and weeds of agriculture and forestry plantations in southern China. Canberra, Australia: Australian Centre for International Agricultural Research (ACIAR). x + 185 pp. (abstract/19981100046)

Löbl I, Smetana A, 2010. Catalogue of Palaearctic Coleoptera, Chrysomeloidae. Volume 6. Stenstrup, Denmark: Apollo Books. 924 pp.

Makihara H, Mannakkara A, Fujimura T, Ohtake A, 2008. Checklist of longicorn coleoptera of Sri Lanka (1) Vesperidae and Cerambycidae excluding Lamiinae. Bulletin of the Forestry and Forest Products Research Institute, Ibaraki. 95-110. http://ss.ffpri.affrc.go.jp/labs/kanko/407-3.pdf (abstract/20093007448)

Mitra B, Bhaumik S, Chakraborti U, Mallick K, 2017. An update on the diversity, distribution and zoo-geographical notes on longhorn beetles (Cerambycidae: Coleoptera) of North-East India. Biological Forum – an International Journal. 9 (2), 61-80.

Mitra B, Chakraborti U, Mallick K, Bhaumik S, Das P, 2017a. An updated list of cerambycid beetles (Coleoptera: Cerambycidae) of Assam, India. Record of the Zoological Survey of India. 117 (1), 78-90.

Mitra B, Das P, Chakraborti U, Mallick K, Chakraborty K, 2016. Long horn beetles (Cerambycidae: Coleoptera) of Nagaland, India. Journal of Global Biosciences. 5 (4), 3963-3969.

Mitra B, Majumder A, Chakraborti U, Das P, Mallick K, 2015. Longhorn beetles (Cerambycidae: Coleoptera) of Himachal Pradesh. Records of the Zoological Survey of India. 115 (4), 405-409.

More SV, Prashant MS, Chandgadkar A, Surve J, 2017. Fauna of long horned beetle (Coleoptera: Cerambycidae) from Tilari forest, Chandgad, Kolhapur District of Maharashtra, a region of Western Ghats. Journal of Entomology and Zoology Studies. 5 (6), 1684-1688.

Mukhopadhyay P, 2011. On a collection of Insecta: Coleopera: Cerambycidae and Curculionidae (Brachyderinae and Otiorrhynchinae) from Uttarakhand. Records of the Zoological Survey of India. 111 (2), 75-88.

Naik P S, More S V, 2019. First report of Aeolesthes holosericea (Fabricius, 1787) (Cerambycidae:Lamiinae) from Goa, India. Entomon. 44 (4), 307-308. (abstract/20203137450)

Nga CTQ, Long KD, Thinh TH, 2014. New Records of the Tribe Cerambycini (Coleoptera: Cerambycidae: Cerambycinae) from Vietnam. Tap Chi Sinh Hoc (Journal of Biology). 36 (4), 428-443.

Salve U S, 2014. Neem, Azadirachta indica Juss. a new host plant of insect Aeolesthes holosericea Fabricius from Maharashtra, India. Online International Interdisciplinary Research Journal. 4 (1), 199-203. http://www.oiirj.org/oiirj/jan-feb2014/24.pdf (abstract/20143164671)

Sengupta C K, Sengupta T, 1981. Cerambycidae (Coleoptera) of Arunachal Pradesh. Records of the Zoological Survey of India. 78 (1/4), 133-154. (abstract/19850528973)

Stebbing E P, 1914. Indian Forest insects of Economic Importance: Coleoptera. London, UK: Eyre & Spottiswoode, Ltd. xvi + 648 pp. (abstract/19150500305)

Tara J S, Ruchie Gupta, Monika Chhetry, 2009. A study on Aeolesthes holosericea Fabricius, an important pest of apple plantations (Malus domestica Borkh.) in Jammu region. Asian Journal of Animal Science. 3 (2), 222-224. (abstract/20093102589)

Vitali F, Gouverneur X, Chemin G, 2017. Revision of the tribe Cerambycini: redefinition of the genera Trirachys Hope, 1843, Aeolesthes Gahan, 1890 and Pseudaeolesthes Plavilstshikov, 1931 (Coleoptera, Cerambycidae). Les Cahiers Magellanes. 40-65.

Contributors

25/08/19 Original text by:

Robert A. Haack, Emeritus Research Entomologist, USDA Forest Service, Lansing, Michigan, USA

Date of report: 29 September, 2020