



Diversity and Abundance of Long-horned beetles (Coleoptera: Cerambycidae) in Jhunjhunu district of Rajasthan, India

Dr. Rajmohan Meena

Department of Zoology, Govt. College, Jayal, Nagaur, Rajasthan, India

Abstract

Jhunjhunu district, located in the semi-arid Shekhawati region of Rajasthan, India, was the focus of long-horned beetle sampling from selected study sites between January 2021 and December 2022. A total of 11 species, representing 11 genera across 4 subfamilies of the Cerambycidae family, were recorded from these sites. The findings show variation in species richness and abundance across the four subfamilies. The subfamily Lamiinae was the most species-rich, with 7 species, followed by Cerambycinae with 2 species, and Spondylidinae and Prioninae, each with 1 species. In terms of individual abundance, Lamiinae was again the most prevalent, comprising 52.22% of the total individuals, followed by Cerambycinae (17.77%), Spondylidinae (16.66%), and Prioninae (13.33%).

Keywords: Diversity, Abundance, Jhunjhunu, Cerambycidae, Long-horned beetles.

Introduction

The Cerambycidae family, commonly known as longhorn beetles or longhorns, is a large and diverse group of beetles. They are characterized by their elongated bodies and long antennae. The Cerambycidae family includes over 35,000 described species (Monné & Hovore, 2021). Longhorn beetles play good ecological roles as both decomposers and potential pests of trees. Cerambycids are found in diverse habitats worldwide, including forests, grasslands, woodlands and even urban environments. They are particularly abundant in tropical regions, but can also be found in temperate and boreal zones. These beetles are primarily associated with woody plants, as their larvae develop within the wood of various tree species. However, some species also infest herbaceous plants or feed on decaying organic matter (Martins and Galileo, 2018).

Sengupta and Sengupta (1981) [25] reported 16 species of cerambycid beetle from Arunachal Pradesh which was reported for the first time from this area. Basak and Biswas (1985) also recorded 12 species of Cerambycidae from Namdapha wildlife sanctuary of Arunachal Pradesh and in 1993 subsequently contributed to the cerambycid fauna of the state of Orissa. Biswas and Basak (1992) reviewed six species of the genus *Apomecyna* along with a morpho-taxonomic key. Raychaudhury and Saha (2001) [23] revealed 12 species of cerambycid beetles from Buxa tiger reserve of West Bengal. Mukhopadhyay and Halder studied cerambycid beetles of Sikkim in 2003 and cerambycid beetles of Manipur in 2004.

Sen and Ghate (2005) [26, 27] reported *Astathes bimaculata* (Fabricius) from Kerala. Sen *et al.*, (2005) [26, 27] reported two species *Priotyrrannus mordax* (White) and *Pachylocerus corallines* Hope from Goa and one species *Pachylocerus crassicornis* (Olivier) from Maharashtra. Diversity of 153 species of cerambycid beetles related to 91 genera of four subfamilies of Sierra of Huautla, Morelos, Mexico was described by Noguera *et al.*, (2002) [17]. Eisa *et al.*, (2011) recorded 7 species of longhorned beetles in the

Kordofan region, Sudan. Peris-Felipó *et al.*, (2011) [21] reported diversity of 27 species of cerambycid beetles in the Mediterranean landscape of Carrascal de La Font Roja, Spain. Similarly, Peris-Felipo and Jiménez-Peydró (2012) [20] studied the diversity of 62 species of cerambycid beetles in Mediterranean landscapes of Spain.

Diversity and abundance of 16 species of longhorn beetles related to 12 genera were reported from Gunung Walat Educational Forest, West Java, Indonesia (Sataral *et al.*, 2015) [24]. Keszthelyi (2015) studied diversity and seasonal patterns of 69 species of cerambycid beetles from Hungary. Fahri *et al.*, (2016) studied diversity and abundance of long horned beetles in Jambi Province, Indonesia. A total of 81 species of longhorn beetles related to 53 genera under 3 subfamilies viz., Prioninae, Cerambycinae and lamiinae of the family Cerambycidae were reported from Meghalaya (Mitra *et al.*, 2016). Similarly, Mitra *et al.*, (2017) reported diversity, distribution, and zoo-geographical study of 562 species of cerambycid beetles associated with 211 genera related to 5 subfamilies from North-East Indian states. More *et al.*, (2017) [15] studied 14 species of longhorn beetles associated with 14 genera related to three subfamilies viz., Cerambycinae, Lamiinae and Prioninae from Tilari forest, Kolhapur district, Maharashtra.

Dwari and Mondal (2018) documented diversity of 13 species of longhorn beetles associated with 12 genera under two subfamilies viz., Cerambycinae and Lamiinae from West Bengal. Martínez-Hernández *et al.*, (2019) revealed seasonal diversity of 126 species of cerambycid beetles associated with 81 genera related to four subfamilies from a tropical dry forest of Mexico. Prasad *et al.*, (2020) [22] recorded 21 species of cerambycid related to 14 genera related to 20 tribes of 3 subfamilies viz., Lamiinae, Cerambycinae and Prioninae from north India. Liu *et al.*, (2021) studied spatial distribution pattern of 56 species of cerambycid beetles associated with 6 subfamilies viz., Cerambycinae, Lamiinae, Lepturinae, Aseminae, Prioninae and Disteniinae and revealed that Cerambycinae and Lamiinae to be active in the canopy, Prioninae to be active

in the forest ground and Lepturinae did not exhibit any disparity in the ground and the canopy. Lin *et al.*, (2021) studied census of 52 species of cerambycid beetles of The Macau SAR, China. Geetha and Agarwala (2022) described 28 species of cerambycid beetles associated with 23 genera related to 3 subfamilies viz., Prioninae, Cerambycinae and Lamiinae from Tripura, India, of which 9 species under 7 genera were reported for the first time.

Pathan *et al.*, (2021) [19] conducted a study on distribution and taxonomic note of 7 species of family Cerambycidae from Sindh, Pakistan. Ecological faunistic analysis of 81 species related to 30 genera under 6 subfamilies viz., Prioninae, Lepturinae, Spondylidinae, Apatophyseinae, Cerambycinae and Lamiinae were reported by Akbarovich *et al.*, (2021). Park *et al.*, (2019) [18] revealed composition and abundance of 16 species of cerambycid beetles inhabited by Pine trees in Korea. Biodiversity and spatiotemporal variation of longhorn beetles were studied by

Yotkham *et al.*, (2021) [28] and a total of 199 species related to 6 subfamilies of Cerambycidae were recognised from 6 geographic regions of Thailand.

Material and Methods

A study was conducted from January 2021 to December 2022 across four selected sites in the Jhunjhunu district of Rajasthan, India (Photo Plate 1). Located in the northeastern part of Rajasthan, Jhunjhunu lies between 27°38'–28°31' north latitudes and 75°02'–76°06' east longitudes, covering an area of 5,926 square kilometers. The district is part of the Shekhawati region, which experiences a predominantly semi-arid climate. The coldest months are December and January, with temperatures ranging from 0°C to 15°C, while summer temperatures vary between 32°C and 48°C. The southwest monsoon typically lasts from mid-June to the end of September.

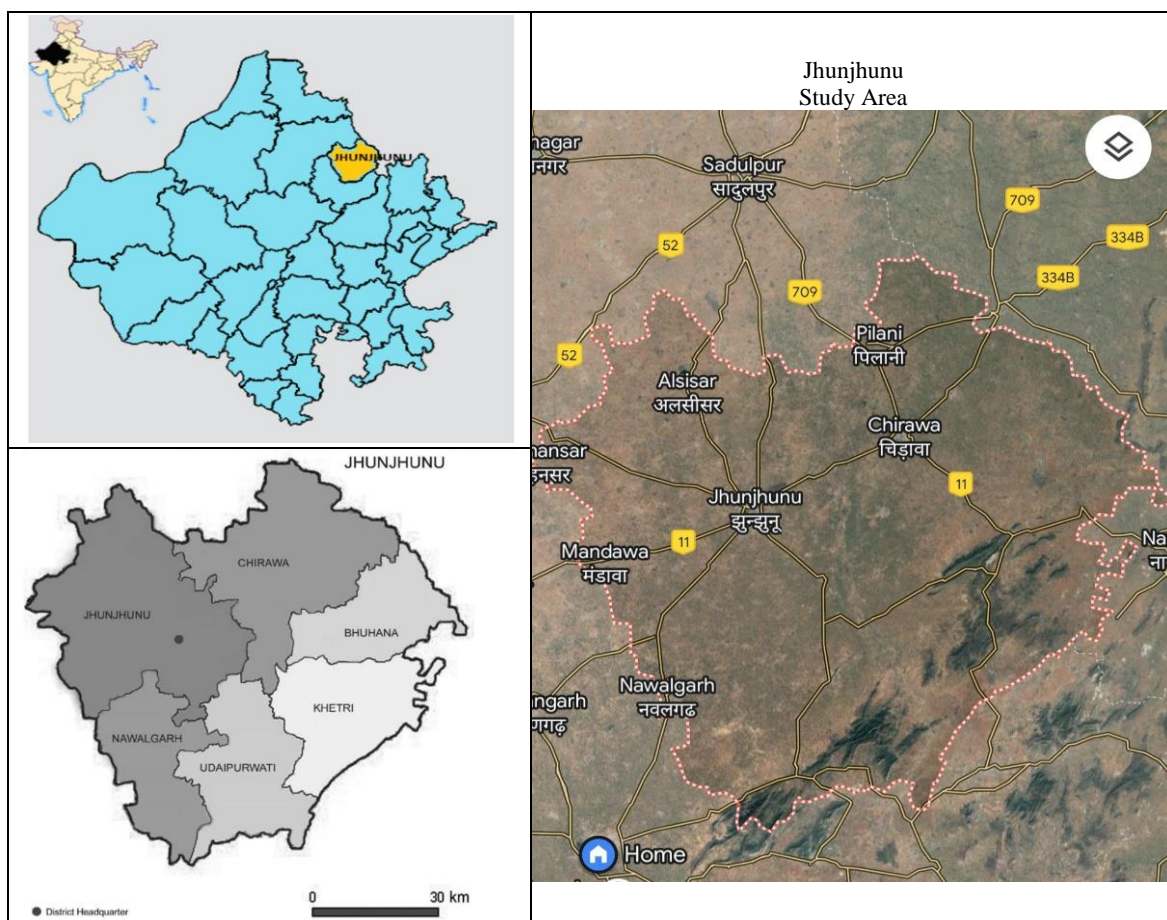


Photo Plate 1: Jhunjhunu district selected as study area

Collection methods: Long-horned beetles were sampled monthly from selected sites within the study area using methods such as handpicking, light traps, and aerial nets. The collected beetles were processed for identification; to preserve their original colour, the specimens were narcotized by exposure to chloroform vapor. Following standard pinning protocols, each specimen was pinned and stored in wooden boxes with naphthalene balls for further examination. The specimens were studied using a Stereo Zoom Binocular Microscope (Magnus MSZ-Bi). After identification, images of the insects were captured using a

Redmi mobile (Model-M1901F7S). The identification process involved consulting various taxonomic keys and published articles.

Results

A total of 11 species belonging to 11 genera under 4 subfamilies of the family Cerambycidae were recorded from January 2021 to December 2022 from four study sites selected in the Jhunjhunu district (Photo Plate 2). As evident from species richness and abundance of different

Subfamilies (Table 2), subfamily Lamiinae was comprised of the highest number of species (7 species), followed by Cerambycinae (2 species), Spondylidinae and Prioninae (1 species each) (Fig 1). As compared to the number of

individuals, again Lamiinae was the most abundant subfamily (52.22% of the total individuals), followed by Cerambycinae (17.77%), Spondylidinae (16.66%) and Prioninae (13.33%) (Fig 1).

Table 1: Long-horned beetles Species of different subfamilies under the Cerambycidae family recorded from January 2021 to December 2022.

S.No.	Family	Subfamilies	Species
1	Cerambycidae	Lamiinae	<i>Nupserha bicolor</i>
2			<i>Niphona fuscatrix</i>
3			<i>Graphisurus fasciatus</i>
4			<i>Olenecamptus bilobus</i>
5			<i>Apomecyna saltator</i>
6			<i>Acalolepta nivosa</i>
7			<i>Stibara nigricornis</i>
8		Cerambycinae	<i>Trichoferus campestris</i>
9			<i>Xylotrechus stebbingi</i>
10		Spondylidinae	<i>Arphopalus rusticus</i>
11		Prioninae	<i>Acanthophorus serraticornis</i>

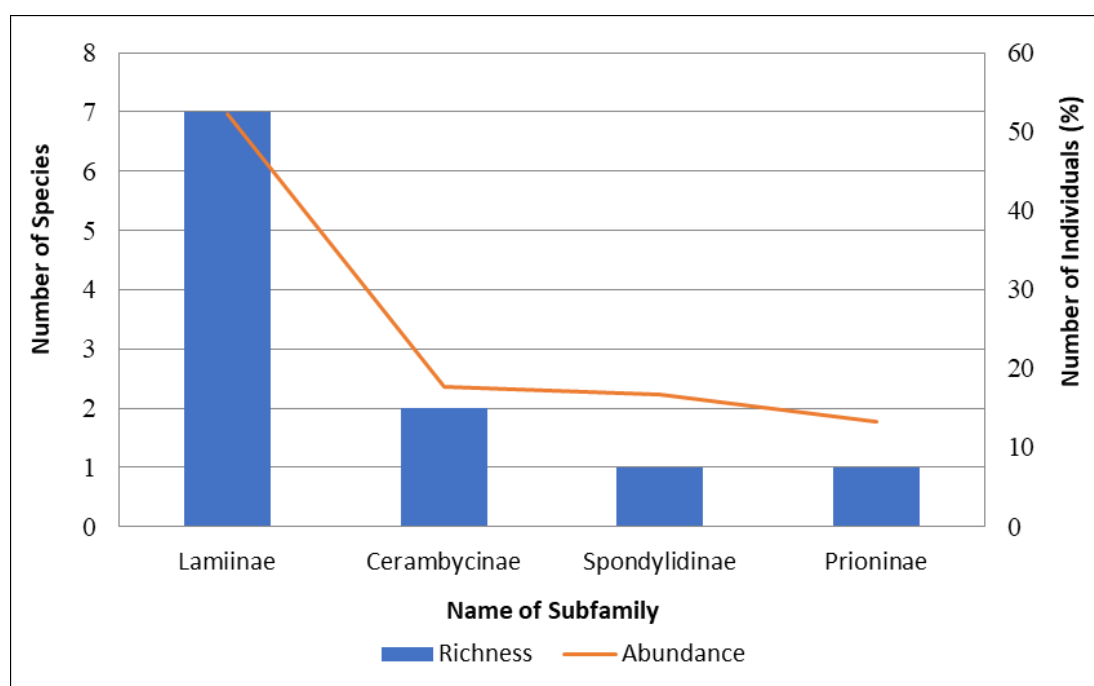


Fig 1: Species richness and abundance of Cerambycidae family in the study area from January 2021 to December 2022.

During the first year of study, maximum number of species belonged to the subfamily Lamiinae constituting 6 species, followed by Cerambycinae, Spondylidinae and Prioninae (1 species each) (Table 2). On the other hand, again maximum number of individuals belonged to the subfamily Lamiinae which constituted 47.22% of the total individuals, followed by Spondylidinae (19.44%), Cerambycinae and Prioninae (16.66% each) (Fig 1).

During the second year of study, maximum number of species belonged to the subfamily Lamiinae constituting 6 species, followed by Cerambycinae (2 species) and Spondylidinae and Prioninae (1 species each) (Table 2). On the other hand, again maximum number of individuals belonged to the subfamily Lamiinae which constituted 55.55% of the total individuals, followed by Cerambycinae (18.51%), Spondylidinae (14.81%) and Prioninae (11.11%) (Fig 1).

Table 2: Species richness and abundance of different subfamilies under the family Cerambycidae recorded from the study area from January 2021 to December 2022.

Cerambycidae	2021		2022		2021-22	
	Richness	Abundance	Richness	Abundance	Richness	Abundance
Lamiinae	6	17	6	30	7	47
Cerambycinae	1	6	2	10	2	16
Spondylidinae	1	7	1	8	1	15
Prioninae	1	6	1	6	1	12
Total	9	36	10	54	11	90



Photo Plate 2: Family- Cerambycidae

Discussion

As compared to previous studies on cerambycid beetle diversity from various regions of India, the present study recorded 11 species of long horned beetles belonging to 11 genera under 4 subfamilies viz., Lamiinae, Cerambycinae, Spondylidinae and Prioninae from the Jhunjhunu district. Similarly, Sengupta and Sengupta (1981) [25] reported 16 species of cerambycid beetle from Arunachal Pradesh which was reported for the first time from the area. Basak and Biswas (1985) also recorded 12 species of Cerambycidae from Namdapha wildlife sanctuary of Arunachal Pradesh. Later Biswas and Basak (1992) reviewed six species of the genus *Apomecyna* along with a morpho-taxonomic key. Similarly, Raychaudhury and Saha (2001) [23] revealed 12 species of cerambycid beetles from Buxa tiger reserve of West Bengal. Mukhopadhyay and Halder dealt with cerambycid beetles of Sikkim in 2003 and cerambycid beetles of Manipur in 2004. However, Peris-Felipó *et al.*, (2011) [21] studied the diversity of 27 species of cerambycid

beetles in the Mediterranean landscape of Carrascal de La Font Roja, Spain.

The present study is in accordance with the study by More *et al.*, (2017) [15] who studied 14 species of longhorn beetles associated with 14 genera related to three subfamilies viz., Cerambycinae, Lamiinae and Prioninae from Tilar forest, Kolhapur district, Maharashtra. Similarly, Dwari and Mondal (2018) documented diversity of 13 species of longhorn beetles associated with 12 genera under two subfamilies viz., Cerambycinae and Lamiinae from West Bengal. However, Park *et al.*, (2019) [18] revealed composition and abundance of 16 species of cerambycid beetles inhabited by Pine trees in Korea. Similarly, Prasad *et al.*, (2020) [22] enlisted 21 species of cerambycid associated with 14 genera related to 20 tribes of 3 subfamilies viz., Lamiinae, Cerambycinae and Prioninae from north India. Likewise, Geetha and Agarwala (2022) described 28 species of cerambycid beetles associated with 23 genera related to 3 subfamilies viz., Prioninae, Cerambycinae and Lamiinae from Tripura, India.

The results of the present study are not in consonance with several reports across the globe. For example, diversity of 153 species of cerambycid beetles related to 91 genera of four subfamilies from Sierra of Huautla, Morelos, Mexico was described by Noguera *et al.*, (2002) ^[17]. Similarly, Biodiversity and spatiotemporal variation of longhorn beetles were studied by Yotkham *et al.*, (2021) ^[28] and a total of 199 species related to 6 subfamilies of Cerambycidae were recognised from 6 geographic regions of Thailand. However, 81 species of longhorn beetles related to 53 genera under 3 subfamilies viz., Prioninae, Cerambycinae and Lamiinae of the family Cerambycidae were reported from Meghalaya (Mitra *et al.*, 2016). Likewise, Lin *et al.*, (2021) studied census of 52 species of cerambycid beetles of The Macau SAR, China. Similarly, Peris-Felipo and Jiménez-Peydró (2012) ^[20] studied the diversity of 62 species of cerambycid beetles in Mediterranean landscapes of Spain. Likewise, Keszthelyi (2015) studied diversity and seasonal patterns of 69 species of longhorn beetles in the Zselic region, Hungary. While, ecological faunistic analysis of 81 species related to 30 genera under 6 subfamilies viz., Prioninae, Lepturinae, Spondylidinae, Apatophyseinae, Cerambycinae and Lamiinae were reported by Akbarovich *et al.*, (2021).

However, the present results are comparatively different from the study by Eisa *et al.*, (2011) who described 7 species of long-horned beetles from the Kordofan region, Sudan. Similarly, Pathan *et al.*, (2021) ^[19] conducted a study on distribution and taxonomic note and recorded 7 species of Cerambycidae family with new records and their association with different weed plants from Sindh, Pakistan.

Conclusion

The present study concluded that the diversity and abundance of long-horned beetles (Coleoptera: Cerambycidae) in semi-arid regions were influenced by their ability to adapt to harsh environmental conditions, their niche specialization, and their seasonal life cycles. Many long-horned beetle species were effective decomposers and woodborers, they laying their eggs in dead or dying trees. Their larvae fed on the wood, breaking it down and aiding in the decomposition process. This helped recycle nutrients back into the soil and ensured the health of the ecosystem. Because many long-horned beetles were associated with decaying wood, their presence could be an indicator of forest health. A decline in beetle populations might have signaled a decrease in the availability of deadwood or the overall health of an ecosystem. Long-horned beetles were diverse, with hundreds of species, many of which had specialized relationships with particular tree species. This diversity contributed to the overall biodiversity of ecosystems. Long-horned beetles are essential for nutrient cycling, food webs, and forest health, while also playing a role in maintaining biodiversity.

References

1. Akbarovich MA, Ilkhomjonovich ZI, Sharibjonovich SD. Ecological-Faunistic analysis of longhorn beetles (Coleoptera: Cerambycidae) of Fergana Valley. *Annals of the Romanian Society for Cell Biology*,2021;25(4):6819-30.
2. Basak PK, Biswas S. Fauna of Namdhapa (Insecta: Coleoptera: Cerambycidae). *Records of the Zoological Survey of India*,1985;82(1-4):215-9.
3. Biswas S, Basak PK. Studies on Longicorn beetles (Coleoptera: Cerambycidae) from India Part I. On Indian species *Apomecyna latreille* with a key to Indian genera of tribe Apomecynini. *Records of the Zoological Survey of India*,1992;92(1-4):161-72.
4. Dwari S, Mondal AK. Diversity of longhorn beetles (Coleoptera: Cerambycidae) of Howrah district, West Bengal, India. *International Journal of Current Research*,2018;10(3):66920-6.
5. Eisa MA, Bashir YGA, Sama G. Survey of the long-horned beetle species (Coleoptera: Cerambycidae) on *Acacia senegal* L. (wild) in Kordofan region, Sudan. *Forestry Ideas*,2011;17:53-61.
6. Fahri, Atmowidi T, Noerdjito WA. Diversity and abundance of Cerambycid beetles in the four major land-use types found in Jambi Province, Indonesia. *Hayati Journal of Biosciences*,2016;23:56-61.
7. Geetha KV, Agarwala BK. A study of longhorn beetles (Coleoptera: Cerambycidae) of Tripura with diagnostic characters of species and new records. *Munis Entomology & Zoology*,2022;17(1):406-29.
8. Keszthelyi S. Diversity and seasonal patterns of longhorn beetles (Coleoptera: Cerambycidae) in the Zselic region, Hungary. *North-Western Journal of Zoology*,2015;11(1):62-9.
9. Lin MY, Perissinotto R, Clennell L. Census of the longhorn beetles (Coleoptera, Cerambycidae and Vesperidae) of the Macau SAR, China. *ZooKeys*,2021;1049:79-161.
10. Liu S, Meng X, Li Y, Meng Q, Zhao H, Jin Y. Spatial distribution pattern of longhorn beetle assemblages (Coleoptera: Cerambycidae) in Mongolian Oak (*Quercus mongolica*) forests in Changbai Mountain, Jilin Province, China. *Research Square*,2021:1-28. Available from: <https://orcid.org/0000-0003-3245-7315>.
11. Martins UR, Galileo MHM. Review of Callidiini (Coleoptera: Cerambycidae: Cerambycinae) of the Atlantic Forest. *Zootaxa*,2018;4444(1):1-133.
12. Mitra B, Bhaumik S, Chakraborti U, Mallick K. An update on the diversity, distribution and zoogeographical notes on longhorn beetles (Cerambycidae: Coleoptera) of North-East India. *Biological Forum – An International Journal*,2017;9(2):61-80.
13. Mitra B, Das P, Chakraborti U, Mallick K, Majumder A. Longhorn beetles (Cerambycidae: Coleoptera) of Meghalaya with eight new records. *Journal of Zoological Studies*,2016;3(4):39-47.
14. Monné MA, Hovore FT, editors. *Electronic Checklist of the Cerambycidae of the Western Hemisphere (version 5.0)*,2021. Available from: <https://cerambycids.com/>.
15. More SV, Prashant MS, Chandgadkar A, Surve J. Fauna of longhorned beetle (Coleoptera: Cerambycidae) from Tilar forest, Chandgad, Kolhapur district of Maharashtra, a region of Western Ghats. *Journal of Entomology and Zoology Studies*,2017;5(6):1684-8.
16. Martinez-Hernandez JG, Corona-Lopez AM, Flores-Palacios A, Ros M, Toledo Hernandez VH. Seasonal diversity of Cerambycidae (Coleoptera) is more complex than thought: evidence from a tropical dry forest of Mexico. *PeerJ*,2019;32(5):1-17.
17. Noguera FA, Zaragoza-Caballero S, Chemsak JA, et al. Diversity of the family Cerambycidae (Coleoptera) of

- the Tropical Dry Forest of Mexico. Conservation Biology and Biodiversity,2002:95(5):617-27.
18. Park Y, Jang T, Won D, Kim J. Composition and abundance of wood-boring beetles inhabited by Pine trees. Journal of Forest and Environmental Science,2019:35(3):189-96.
 19. Pathan KA, Panhwar WA, Shaikh AM, et al. Long horned beetles (Cerambycidae: Coleoptera) with new records and their association with different weed plants in Sindh, Pakistan. Pakistan Journal of Weed Science Research,2021:27(1):97-91.
 20. Peris-Felipo FJ, Jiménez-Peydró R. Cerambycidae (Coleoptera) richness in Mediterranean landscapes of Spain: diversity and community structure analysis. Biodiversity Journal,2012:3(1):59-68.
 21. Peris-Felipo FJ, Falco-Gari JV, Jimenez-Peydro R. The diversity of Cerambycidae in the protected Mediterranean landscape of the Natural Park of Carrascal de La Font Roja, Spain. Bulletin of Insectology,2011:64(1):87-92.
 22. Prasad B, Behere GT, Firake DM. Cerambycidae from selected sites of north India. Indian Journal of Entomology,2020:82(3):435-8.
 23. Raychaudhury D, Saha S. Longicorn beetles (Cerambycidae, Prioninae: Cerambycidae) of Buxa Tiger Reserve, Jalpaiguri, West Bengal. Journal of the Bombay Natural History Society,2001:97(1):74-91.
 24. Sataral M, Atmowidi T, Noerdjito WA. Diversity and abundance of longhorn beetles (Coleoptera: Cerambycidae) in Gunung Walat Educational Forest, West Java, Indonesia. Journal of Insect Biodiversity,2015:3(17):45-57.
 25. Sengupta CK, Sengupta T. Cerambycidae (Coleoptera) of Arunachal Pradesh. Records of the Zoological Survey of India,1981:78:133-54.
 26. Sen A, Ghate HV. A recent record of *Astathes bimaculata* (Fabricius) (Coleoptera: Cerambycidae: Lamiinae) from Kerala. Zoos' Print Journal,2005:20(8):1234-9.
 27. Sen A, Rangnekar S, Rangnekar P, Ghate HV. Record of *Priotyranus mordax* (White) and *Pachylocerus corallines* Hope (Coleoptera: Cerambycidae) from Goa. Zoos' Print Journal,2005:20(5):1869-70.
 28. Yotkham S, Suttiapran P, Likhitrakarn N, Sulin C, Srisuka W. Biodiversity and spatiotemporal variation of longhorn beetles (Coleoptera: Cerambycidae) in Tropical Forest of Thailand. Insects,2021:12(1):1-13.