

10.11609/jott.2026.18.1.28151-28262

www.threatenedtaxa.org

26 January 2026 (Online & Print)

18(1): 28151-28262

ISSN 0974-7907 (Online)

ISSN 0974-7893 (Print)



Building evidence for conservation globally

Journal of Threatened Taxa



Open Access



ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher
Wildlife Information Liaison Development Society
www.wild.zooreach.org

Host
Zoo Outreach Organization
www.zooreach.org

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Cover: Golden-headed Lion Tamarin *Leontopithecus chrysomelas*. Watercolor and acrylics by P. Kritika.



INTRODUCTION

Hymenoptera is one of the fourth largest orders of insects after Coleoptera, Lepidoptera, and Diptera but is the most important order due to its economic value, ecological role as pollinators, biological pest control agents, and scavengers of the environment. It is well known that the increasing anthropogenic activities have shown detrimental effects on the biodiversity loss. There are many studies which provide us the direct evidence of the potentially drastic effect of this biodiversity loss on human health and nutrition (Martens et al. 1997; Sala et al. 2009; Eilers et al. 2011; Myers et al. 2013). The decline of pollinating species can lead to a parallel decline of plant species as 35% crops which account for global food production and supply up to 40% of the world's supply of nutrients depend entirely on animal pollinators (Williams et al. 1991; Klein et al. 2007; Eilers et al. 2011). Bees and wasps are the most economically valuable pollinators of crop plants worldwide, and the yields of some fruit, seed, and nut crops decrease by more than 90% without these pollinators (McGregor 1976; Southwick 1992; Roubik 2002). Populations of wild pollinators can enhance production of many crops, but many of them are still awaiting similar comparative pollinator studies. Even the ants are ecologically very important as they turn and aerate the soil, allowing water and oxygen to reach plant roots. Ants also act as decomposers in environment by feeding on organic waste, insects and other dead animals and help in cleaning the environment. Some wasps are important predators of crop pests and can be used as biological control agents as substitutes for chemical pesticides, which have adverse effects on crop yield. The evidence of successful use of the species as biological control agents is already documented (Donovan 2003). The social paper wasp *Polistes satam* is a successful predator on the larvae of two economically important crop pests, the sugarcane borer *Diatraea saccharalis* (a predator of Sugarcane *Saccharum* spp.) and the fall armyworm *Spodoptera frugiperda* (a predator of Maize *Zea mays*) (Southon et al. 2019). Similarly, the predatory activity of *Polistes canadensis* on *Plutella xylostella*, a predator of *Brassica oleracea* has been observed (Montefusco et al. 2017). Keeping in view the importance of this aspect of biodiversity, a preliminary taxonomic survey has been conducted on the hymenopteran insects of Jammu region. The species are catalogued systematically under the respective superfamilies, families, and subfamilies. The approach will prove useful in the conservation of the species as the first step of conservation is to identify

them and then develop detailed conservation plans.

MATERIAL AND METHODS

Study area

The present study was undertaken at various geographical locations in different districts of Jammu region for a period of four years from 2019–2022. The different areas including crop fields, gardens, grasslands, forest areas, and household places, were explored for the collection of insects belonging to Hymenoptera. The areas covered for the collection of specimens are depicted in Table 1 and Figure 1.

Methods

Collection of the insects was done with the use of collection nets and hand picking. The collected samples were killed with ethyl acetate vapours. The specimens were stretched and properly preserved in fumigated insect boxes. Keys given by Bingham (1897), Goulet & Huber (1993), Carpenter & Nguyen (2003), Michener (2007, 2010), Saini et al. (2011), and online identification platforms like Antwiki, iNaturalists were used to identify the collected specimens. The collected species after dry or wet preservation were submitted in the museum of Department of Zoology, University of Jammu and ZSI Kerala.

RESULTS AND DISCUSSION

A total of 27 geographical locations from different districts of Jammu region were surveyed from January 2019 to September 2022 and a total of 165 insect samples were collected. They were found to belong to 51 different species, 37 genera, and 10 families with maximum 22 species of the family Formicidae, 13 species of the family Vespidae, six species of Apidae, two species of Crabronidae & Sphecidae each, and the families Evaniidae, Halictidae, Megachillidae, Mutillidae, & Pompilidae are represented by one species each (Image 1–51). A total of 14 species were found to be new records from the region. All the identified species were submitted in the depository and their respective accession number were generated.

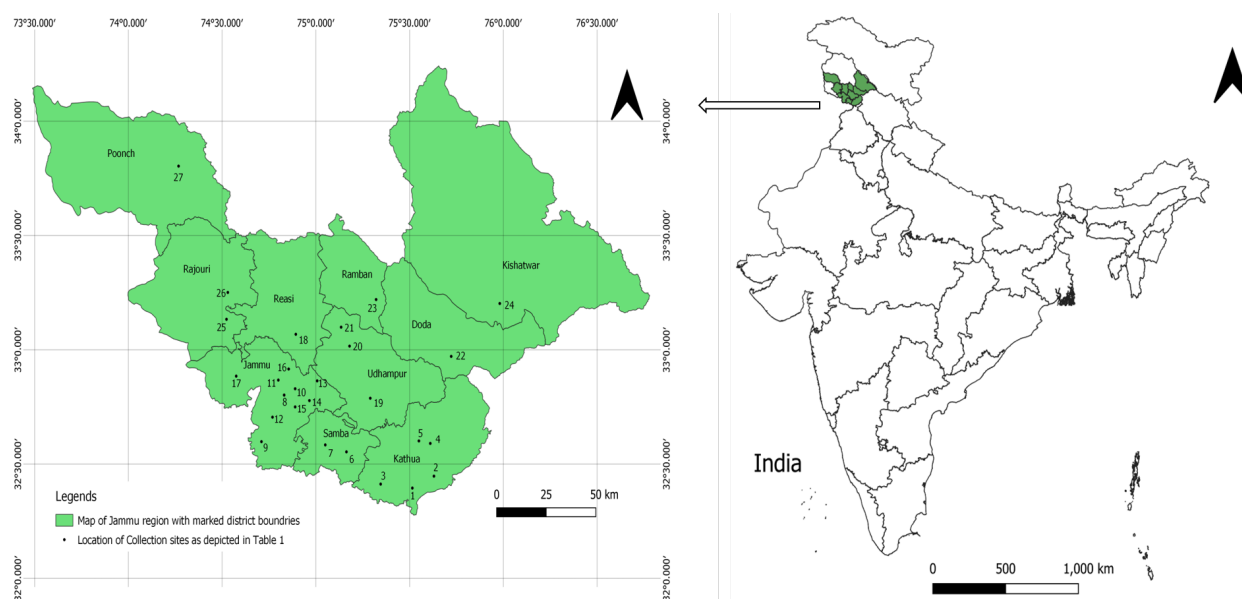


Figure 1. Map depicting collection sites for the present study.

The systematic checklist is as:

Order Hymenoptera Linnaeus, 1758

Suborder Apocrita Gerstaecker, 1867

Superfamily Apoidea Latreille, 1802

Family Apidae Latreille, 1802

Genus *Apis* Linnaeus, 1758

Apis cerana Fabricus, 1793

Material examined: 2 females, India, Jammu & Kashmir, Jammu, Girls Hostel University of Jammu, 32.718° N, 74.870° E, 319 m, 29.viii.2019 (Reg. No. ZOO211.1, ZOO211.2); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.604° N, 75.288° E, 516 m, 29.iv.2022 (Reg. No. ZOO21.3); 1 female, India, Jammu & Kashmir, Kathua, Jasrota Wildlife Sanctuary, 32.459° N, 75.411° E, 364 m, 16.v.2022 (Reg. No. ZOO211.4); 1 female, India, Jammu & Kashmir, Jammu, GCW Parade, 32.737° N, 74.865° E, 370 m, 20. vii.2022 (Reg. No. ZOO211.5).

Distribution in India: Central India, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab.

Apis dorsata Fabricus, 1793

Material examined: 2 females, India, Jammu & Kashmir, Jammu, Girls Hostel University of Jammu, 32.718° N, 74.870° E, 319 m, 29.viii.2019 (Reg. No. ZOO212.1, ZOO212.2); 1 female, 1 male, India, Jammu & Kashmir, Kathua, 32.732° N, 74.864° E, 352 m, 26.xii.2020 (Reg. No. ZOO212.3, ZOO212.4).

Distribution in India: Throughout India.

Apis mellifera Linnaeus, 1758

Material examined: 2 females, India, Jammu & Kashmir, Samba, Vijayapur, 32.705° N, 74.880° E, 341 m, 11.vi.2021 (Reg. No. ZOO213.1, ZOO213.2); 1 female, India, Jammu & Kashmir, Kathua, Jasrota Wildlife Sanctuary, 32.459° N, 75.411° E, 364 m, 16.v.2022 (Reg. No. ZOO213.4).

Distribution in India: Throughout India.

Tribe Bombini Latreille, 1802

Genus *Bombus* Latreille, 1802

Bombus haemorrhoidalis Smith, 1852

Material examined: 2 females, India, Jammu & Kashmir, Kathua, Ramkot, 32.610° N, 75.282° E, 505 m, 23.vi.2019 (Reg. No. ZOO214.1, ZOO214.2); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.604° N, 75.288° E, 516 m, 25.xi.2019 (Reg. No. ZOO214.3); 2 females, India, Jammu & Kashmir, Kathua, Ramkot, 32.608° N, 75.278° E, 449 m, 24.x.2019 (Reg. No. ZOO214.4, ZOO214.5); 1 male, India, Jammu & Kashmir, Kathua, Ramkot, 32.641° N, 75.343° E, 666 m, 25.xii.2019 (Reg. No. ZOO214.6); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.641° N, 75.349° E, 669 m, 7.vii.2020 (Reg. No. ZOO214.7).

Distribution in India: Jammu & Kashmir, Punjab, Uttarakhand, West Bengal.

Table 1. The geographical information of the collection sites.

Country	State/UT	District	Name of collection site	Latitude (°N)	Longitude (°E)	Height (m)
India	Jammu & Kashmir	Doda	Doda	33.1493	75.5477	1,200
		Jammu	Akhnoor	32.8995	74.7425	330
			Arnia	32.5192	74.7995	271
			Bantalab	32.7843	74.8237	375
			Botany Department, JU	32.7189	74.8680	313
			Botanical Garden, JU	32.7194	74.8681	314
			Department of Zoology	32.7242	74.8666	316
			Gandhinagar, Jammu	32.7014	74.8596	302
			GCW Parade	32.7377	74.8656	370
			Hostel, JU	32.7180	74.8702	319
			Janipur	32.7553	74.8497	385
			Kot Balwal	32.7334	74.8760	309
			Manda Zoo	32.7497	74.8673	414
			Manda Zoo	32.7503	74.8713	412
			R.S. Pura	32.6049	74.7315	272
			Talab Tillo	32.7226	74.8376	287
		Kathua	GDC Kathua	32.3863	75.5300	344
			Jasrota Mata	32.4717	75.4259	383
			Jasrota Wildlife Sanctuary	32.4596	75.4113	364
			Jatwal	32.5297	75.1689	395
			Kathua Station 1	32.3857	75.5186	348
			Kathua Station 2	32.4510	75.3705	359
			Kathua Station 3	32.7329	74.8642	352
			Nagrota Gujroo	32.6430	75.3911	768
			Ramkot Station 1	32.6042	75.2881	516
			Ramkot Station 2	32.6081	75.2786	449
			Ramkot Station 3	32.6101	75.2822	505
			Ramkot Station 4	32.6103	75.2823	500
			Ramkot Station 5	32.6418	75.3436	666
			Ramkot Station 6	32.6418	75.3494	669
		Kishtwar	Kishtwar	33.3223	75.7765	1,801
		Poonch	Mendhar	33.6051	74.1431	938
		Rajouri	Rajouri	33.3818	74.3865	1,035
			Sunderbani	33.0493	74.4907	576
		Ramban	Ramban	33.2464	75.1939	935
			Sanasar	33.0653	75.1565	1,727
		Reasi	Domael, Katra	32.9395	74.9499	715
		Samba	Ghaghwal	32.5092	75.1863	366
			Vijaypur	32.7053	74.8800	341
		Udhampur	Patnitop	33.0847	75.3354	2,024
			Udhampur	32.9160	75.1416	680

Subfamily Xylocopinae Latreille, 1802**Tribe Xylocopini** Latreille, 1802**Genus *Xylocopa*** Latreille, 1802***Xylocopa fenestrata*** Fabricius, 1798

Material examined: 1 female, India, Jammu & Kashmir, Jammu, Botanical Garden of University of Jammu, 32.719° N, 74.868° E, 314 m, 16.iv.2019 (Reg. No. ZOO215.1); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.610° N, 75.2822° E, 505 m, 08.vi.2020.

Distribution in India: Arunachal Pradesh, Bihar, Goa, Gujarat, Himachal Pradesh, Jammu & Kashmir, Maharashtra, Odisha, Punjab, Tamil Nadu, Uttar Pradesh, Uttarakhand, West Bengal.

Xylocopa pubescens Spinola, 1838

Material examined: 1 female, India, Jammu & Kashmir, Jammu, Botanical Garden of University of Jammu, 32.719° N, 74.868° E, 314 m, 18.iv.2019 (Reg. No. ZOO260.1).

Distribution in India: Bihar, Jammu & Kashmir, Karnataka, Odisha, Sikkim, Tamil Nadu, West Bengal.

Family Crabronidae Latreille, 1802**Subfamily Crabroniidae** Latreille, 1802**Tribe Larrini** Latreille, 1810**Genus *Tachysphex*** Kohl, 1883

Material examined: 1 female, India, Jammu & Kashmir, Rajouri, Sunderbani, 33.049° N, 74.490° E, 576 m, 10.x.2022 (Reg. No. ZOO216).

Genus *Tachytes* Panzer, 1806

Material examined: 1 female, India: Jammu & Kashmir, Kathua, Ramkot, 32.604° N, 75.288° E, 516 m, 25.viii.2019 (Reg. No. ZOO217).

Family Halictidae Thomson, 1869**Tribe Halcitini** Thomson, 1869**Genus *Halictus*** Latreille, 1804***Halictus vicinus*** Vachal, 1895

Material examined: 2 females, India, Jammu & Kashmir, Kathua, Ramkot, 32.608° N, 75.278° E, 449 m, 24.x.2019 (Reg. No. ZOO218.1, ZOO218.2); 1 female, India, Jammu & Kashmir, Ramban, 33.246° N, 75.193° E, 935 m, 15.iv.2022 (Reg. No. ZOO218.3); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.6081° N, 75.2786° E, 449 m, 05.ii.2022 (Reg. No. ZOO218.4).

Distribution in India: Assam, Jammu & Kashmir, Kerala, Madhya Pradesh, Punjab, Rajasthan, Sikkim, Uttarakhand, West Bengal.

Family Megachilidae Latreille, 1802**Genus *Megachile*** Latreille, 1802***Megachile lanata*** Fabricius, 1798

Material examined: 2 females, India, Jammu & Kashmir, Kathua, Nagrota Gujroo, 32.643° N, 75.391° E, 768 m, 15.ix.2019 (Reg. No. ZOO219.1, ZOO219.2).

Distribution in India: Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Odisha, Uttarakhand, Punjab, West Bengal.

Family Sphecidae Latreille, 1802**Subfamily Sceliphrinae** Latreille, 1802**Genus *Chalybion*** Dahlbom, 1843***Chalybion bengalense*** Dahlbom, 1845

Material examined: 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.641° N, 75.343° E, 666 m, 7.x.2020 (Reg. No. ZOO220.1); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.641° N, 75.343° E, 666 m, 29.iv.2022 (Reg. No. ZOO220.2); 1 male, India, Jammu & Kashmir, Jammu, University of Jammu, 32.724° N, 74.866° E, 316 m, 08.ii.2022 (Reg. No. ZOO220.3).

Distribution in India: Andhra Pradesh, Arunachal Pradesh, Chhattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Jammu and Kashmir (new record), Kerala, Madhya Pradesh, Punjab, West Bengal.

Genus *Sceliphron*, Klug, 1801***Sceliphron madraspatanum*** Fabricius, 1781

Material examined: 2 females, India, Jammu and Kashmir, Kathua, Jasrota Wildlife sanctuary, 32.459° N, 75.411° E, 364 m, 30.iv.2022 (Reg. No. ZOO221.1, ZOO221.2); 1 female, India, Jammu and Kashmir, Jammu, University of Jammu, Department of Zoology, 32.724° N, 74.866° E, 316 m, 09.vi.2022 (Reg. No. ZOO221.3).

Distribution in India: Assam, Arunachal Pradesh, Delhi, Himachal Pradesh, Jammu & Kashmir (new record), Kerala, Maharashtra, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu, Odisha, Uttar Pradesh.

Superfamily Evanioidea Latreille, 1802**Family Evaniidae** Latreille, 1802**Genus *Evania*** Fabricius, 1775***Evania appendigaster*** Linnaeus, 1758

Material examined: 1 female, India, Jammu & Kashmir, Jammu, R.S. Pura, 32.604° N, 74.731° E, 272 m, 24.iv.2022 (Reg. No. ZOO222.1)

Distribution in India: Andhra Pradesh, Assam, Gujarat, Haryana, Jammu and Kashmir, Karnataka, Kerala, Maharashtra, Odisha, Tamil Nadu, Telangana, Uttar Pradesh, West Bengal.

Superfamily Vespoidea Latreille, 1802

Family Formicidae Latreille, 1809

Subfamily Dolichoderinae Forel, 1878

Genus *Tapinoma* Foerster, 1850

Tapinoma melanocephalum Fabricius, 1793

Material examined: 2 females, India, Jammu & Kashmir, University of Jammu, Girls hostel, 32.718° N, 74.870° E, 319 m, 30.xii.2021 (Reg. No. ZOO223.1, ZOO223.2).

Distribution in India: All over India.

Subfamily Dorylinae Leach, 1815

Genus *Aenictus* Shuckard, 1840

Aenictus aitkeni Foral, 1901

Material examined: 1♂ (worker caste), India, Jammu & Kashmir, Kathua, Ramkot, 32.641° N, 75.343° E, 666 m, 15.x.2021 (Reg. No. ZOO224.1).

Distribution in India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Manipur, Sikkim, and West Bengal.

Genus *Dorylus* Fabricius, 1793

Dorylus laevigatus Smith, 1857

Material examined: 1 male, India, Jammu & Kashmir, Kathua, Ramkot, 32.641° N, 75.349° E, 669 m, 07.vii.2020 (Reg. No. ZOO225.1)

Distribution in India: Arunachal Pradesh, Jammu & Kashmir (new record).

Subfamily Formicinae Latreille, 1809

Tribe Camponotini Forel, 1878

Genus *Camponotus* Mayr, 1861

Material examined: 2 females, India, Jammu & Kashmir, Kathua, Jasrota wildlife sanctuary, 32.459° N, 75.411° E, 309 m, 14.v.2022 (Reg. No. ZOO255.1).

Camponotus compressus Fabricius, 1787

Material examined: 1 female, India, Jammu & Kashmir, Ramban, Sanasar, 33.122° N, 75.262° E, 2048 m, 07.vii.2019 (Reg. No. ZOO226.1); 2 females, India, Jammu & Kashmir, Kathua, Ramkot, 32.641° N, 75.343° E, 666 m, 23.iv.2022 (Reg. No. ZOO226.2, ZOO226.3); 2 females, India, Jammu & Kashmir, Kathua, Jasrota wildlife sanctuary, 32.459° N, 75.411° E, 364 m, 14.iv.2022 (Reg. No. ZOO226.4, ZOO226.5); 2 females, India, Jammu & Kashmir, Jammu, Arnia, 32.519° N, 74.799° E, 271 m, 15.v.2022 (Reg. No. ZOO226.6, ZOO226.7); 2 females, India, Jammu & Kashmir, Jammu, University of Jammu, Department of Botany, 32.718° N, 74.868° E, 313 m, 22.vii.2022 (Reg. No. ZOO226.8, ZOO226.9); 1 female, India, Jammu and Kashmir, Jammu, Kot Balwal, 32.733°

N, 74.876° E, 309 m, 05.xii.2022 (Reg. No. ZOO226.10).

Distribution in India: All over India.

Camponotus pennsylvanicus de Geer, 1773

Material examined: 1 female, India, Jammu & Kashmir, Jammu, University of Jammu, Department of Zoology, 32.724° N, 74.866° E, 316 m, 27.xii.2021 (Reg. No. ZOO227.1).

Distribution in India: Assam, Jammu & Kashmir (new record).

Genus *Polyrhachis* Smith, 1857

Polyrhachis lacteipennis Smith, 1858

Material examined: 2♀, India, Jammu & Kashmir, Poonch, Mendhar, 33.605° N, 74.143° E, 939 m, 05.xi.2022 (Reg. No. ZOO228.1, ZOO228.2);

Distribution in India: Arunachal Pradesh, Assam, Gujarat, Himachal Pradesh, Jammu & Kashmir, Karnataka, Punjab, Uttarakhand, West Bengal.

Tribe Formicini Latreille, 1809

Genus *Formica* Linnaeus, 1758

Formica clara Forel, 1886

Material examined: 2♀, India, Jammu & Kashmir, Doda, 33.149° N, 75.547° E, 1200 m, 10.x.2021 (Reg. No. ZOO256.1).

Distribution in India: Himachal Pradesh, Jammu & Kashmir.

Tribe Plagiolepidini

Genus *Lepisiota* Santschi, 1926

Lepisiota integra Forel, 1894

Material examined: 1 female, India, Jammu & Kashmir, Jammu, Manda, 32.749° N, 74.867° E, 414 m, 08.iii.2022 (Reg. No. ZOO229.1); 2 females, India, Jammu & Kashmir, Jammu, Gandhinagar, 32.701° N, 74.859° E, 302 m, 05.iv.2022 (Reg. No. ZOO229.2, ZOO229.3); 1 female, India, Jammu & Kashmir, Jammu, Kathua, Jatwal, 32.529° N, 75.168° E, 395 m, 15.v.2022 (Reg. No. ZOO229.4); 2 females, India, Jammu & Kashmir, Kathua, Jasrota wildlife sanctuary, 32.459° N, 75.411° E, 364 m, 16.v.2022 (Reg. No. ZOO229.5, ZOO229.6); 1 female, India, Jammu & Kashmir, Jammu, Bantalab, 32.784° N, 74.823° E, 375 m, 17.v.2022 (Reg. No. ZOO229.7).

Distribution in India: Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Meghalaya, Punjab, Uttar Pradesh.

Lepisiota sericea Forel, 1992

Material examined: 2♀, India, Jammu & Kashmir, Jammu, Manda Zoo, 32.750° N, 74.871° E, 412 m,

08.iii.2022 (Reg. No. ZOO230.1); 2♂, India, Jammu & Kashmir, Kathua, Ramkot, Government Higher Secondary School, 32.641° N, 75.349° E, 669 m, 23.iv.2022 (Reg. No. ZOO230.2).

Distribution in India: Himachal Pradesh, Jammu & Kashmir, Maharashtra.

Subfamily Myrmicinae de Saint-Fargeau, 1835

Tribe Attini

Genus *Pheidole* Westwood, 1839

Pheidole indica Mayr, 1879

Material examined: 3♂, India, Jammu & Kashmir, Rajouri, 33.381° N, 74.386° E, 1035 m, 30.xi.2022 (Reg. No. ZOO231.1).

Distribution in India: Arunachal Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Meghalaya, Nagaland, Orissa, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

Tribe: Crematogastrini Forel, 1893

Genus *Tetramorium* Mayr, 1855

Tetramorium similimum Smith, 1886

Material examined: 2 females, India, Jammu & Kashmir, Jammu, Arnia, 32.519° N, 74.799° E, 271 m, 15.v.2022 (Reg. No. ZOO257.1, ZOO258.2).

Distribution in India: Himachal Pradesh, Jammu & Kashmir, Karnataka, Maharashtra, Punjab, West Bengal.

Genus *Trichomyrmex* Mayr, 1865

Trichomyrmex aberrans Forel, 1902

Material examined: 2 females, India, Jammu & Kashmir, Jammu, University of Jammu, Botanical Garden, 32.719° N, 74.868° E, 314 m, 17.vii.2019 (Reg. No. ZOO232.1).

Distribution in India: Arunachal Pradesh, Haryana, Himachal Pradesh, Jammu & Kashmir, Kerala, Madhya Pradesh, Meghalaya, Punjab, Uttar Pradesh.

Trichomyrmex destructor Jerdon, 1851

Material examined: 3♂, India, Jammu & Kashmir, Kathua, GDC Kathua, 32.386° N, 75.530° E, 344 m, 17.iv.2022 (Reg. No. ZOO233.1, ZOO233.2, ZOO233.3); 2♂, India, Jammu & Kashmir, Jammu, Janipur, 32.755° N, 74.849° E, 385 m, 18.iv.2022 (Reg. No. ZOO233.4, ZOO233.5); 2♂, India, Jammu & Kashmir, Kathua, Jatwal, 32.529° N, 75.168° E, 395 m, 15.v.2022 (Reg. No. ZOO233.6, ZOO233.7).

Distribution in India: Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Punjab, Rajasthan,

Tamil Nadu, Uttar Pradesh, West Bengal.

Trichomyrmex scabriceps Mayr, 1879

Material examined: 2 females, India, Jammu & Kashmir, Kathua, Jasrota wildlife sanctuary, 32.459° N, 75.411° E, 364 m, 14.iv.2022 (Reg. No. ZOO234.1).

Distribution in India: Arunachal Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Maharashtra, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

Tribe Myrmicini de Saint-Fargeau, 1835

Genus *Myrmica* Latreille, 1804

Myrmica aimonissabaudiae Menozzi, 1939

Material examined: 2 females, India, Jammu & Kashmir, Udhampur, Patni top, 33.084° N, 75.335° E, 2024 m, 07.vii.2019 (Reg. No. ZOO258.1, ZOO258.2)

Distribution in India: Himachal Pradesh, Jammu & Kashmir, Meghalaya, Sikkim, West Bengal.

Tribe Solenopsidini Forel, 1893

Genus *Monomorium* Mayr, 1855

Monomorium indicum Forel, 1902

Material examined: 2 females, 1 male, India, Jammu & Kashmir, Samba, Ghagwal, 32.509° N, 75.186° E, 366 m, 29.ix.2021 (Reg. No. ZOO235.1, ZOO235.2, ZOO235.3); 1 female, India, Jammu & Kashmir, Ramban, 33.246° N, 75.193° E, 935 m, 15.iv.2022 (Reg. No. ZOO235.4); 1 male, India, Jammu & Kashmir, Kathua, 32.451° N, 75.370° E, 359 m, 22.iv.2022 (Reg. No. ZOO235.5); 2 females, India, Jammu & Kashmir, Kathua, 32.385° N, 75.518° E, 348 m, 22.iv.2022 (Reg. No. ZOO235.6).

Distribution in India: Andhra Pradesh, Arunachal Pradesh, Assam, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Maharashtra, Manipur, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

Genus *Myrmecaria* Saunders, 1842

Myrmecaria brunnea Saunders, 1842

Material examined: 1 female, 2 males, India, Jammu & Kashmir, Jammu, Manda Zoo, 32.750° N, 74.871° E, 412 m, 08.iii.2022 (Reg. No. ZOO236.1).

Distribution in India: Arunachal Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

Tribe Stenammini Ashmead, 1905**Genus *Messor*** Forel, 1890***Messor himalayanus*** Forel, 1902

Material examined: 3 females, India, Jammu & Kashmir, Doda, 33.1493° N, 75.5477° E, 1200 m, 01.v.2022 (Reg. No. ZOO237.1, ZOO237.2, ZOO237.3).

Distribution in India: Himachal Pradesh, Jammu & Kashmir, Kerala, Punjab, Rajasthan.

Messor instabilis Smith, 1858

Material examined: 1 female, 1 male, India, Jammu & Kashmir, Kathua, 32.385° N, 75.518° E, 348 m, 22.iv.2022 (Reg. No. ZOO238.1, ZOO238.2).

Distribution in India: Andhra Pradesh, Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, and Uttar Pradesh.

Tribe Ponerini de Saint-Fargear, 1835**Genus *Leptogenys*** Roger, 1861***Leptogenys diminuta*** Smith, 1857

Material examined: 2♀, India, Jammu & Kashmir, Kathua, Jasrota wildlife sanctuary, 32.459° N, 75.411° E, 364 m, 17.iv.2022 (Reg. No. ZOO239.1, ZOO239.2); 2♀, India, Jammu & Kashmir, Kathua, Ramkot, 32.641° N, 75.343° E, 666 m, 12.vi.2022 (Reg. No. ZOO239.3).

Distribution in India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Maharashtra, Meghalaya, Orissa, Sikkim, Tamil Nadu, and West Bengal.

Genus *Odontoponera* Mayr, 1862***Odontoponera denticulate*** Smith, 1857

Material examined: 2 females, India, Jammu & Kashmir, Kathua, Jasrota, Jasrotsa mata temple, 32.471° N, 75.425° E, 383 m, 15.iv.2022 (Reg. No. ZOO240.1, ZOO240.2).

Distribution in India: Arunachal Pradesh, Assam, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Meghalaya, Nagaland, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh, and West Bengal.

Subfamily Pseudomyrmecinae**Genus *Tetraponera*** Smith, 1852***Tetraponera rufonigra*** Jerdon, 1851

Material examined: 2♀, India, Jammu & Kashmir, Kathua, Ramkot, Govt: Higher Secondary School, 3.641° N, 75.343° E, 666 m, 23.iv.2022 (Reg. No. ZOO241.1, ZOO241.2).

Distribution in India: Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka,

Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand, and West Bengal.

Family Vespidae Latreille, 1802**Genus *Indodynerus*** Gusenleitner, 2008***Indodynerus capitatus*** Gusenleitner, 2008

Material examined: 1 female, India, Jammu & Kashmir, Kathua, 32.451° N, 75.370° E, 359 m, 24.iv.2022; 1 female, India, Jammu & Kashmir, Jammu, University of Jammu, Botanical Garden, 32.719° N, 74.868° E, 314 m, 15.ix.2022 (Reg. No. ZOO243.1).

Distribution in India: Chhattisgarh, Goa, Jammu & Kashmir (new record), Karnataka, Kerala, and Madhya Pradesh.

Genus *Vespa* Linnaeus, 1758***Vespa basalis*** Smith, 1852

Material examined: 1 female, India, Jammu & Kashmir, Jammu, Jammu university Hostel, 32.718° N, 74.870° E, 319 m, 04.vii.2019 (Reg. No. ZOO244.1); 3 females, India, Jammu & Kashmir, Reasi, Domael, 32.939° N, 74.949° E, 715 m, 04.xi.2019 (Reg. No. ZOO244.2, ZOO244.3, ZOO244.4); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.610° N, 75.278° E, 449 m, 22.iii.2020 ((Reg. No. ZOO244.5); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.610° N, 75.278° E, 449 m, 03.iv.2022 (Reg. No. ZOO244.6).

Distribution in India: Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir (new record), Meghalaya, Mizoram, Orissa, Sikkim, Uttarakhand, Uttar Pradesh, and West Bengal.

Vespa tropica Linnaeus, 1758

Material examined: 2 females, India, Jammu & Kashmir, Kathua, Ramkot, 32.610° N, 75.282° E, 500 m, 06.viii.2019 (Reg. No. ZOO245.1, ZOO245.2); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.610° N, 75.282° E, 500 m, 03.iv.2020 (Reg. No. ZOO245.3); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.608° N, 75.282° E, 449 m, 07.vii.2022 (Reg. No. ZOO245.4).

Distribution in India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Jammu and Kashmir (new record), Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Orissa, Pondicherry, Sikkim, Tamil Nadu, Uttarakhand, and West Bengal.

Vespa velutina Lepeletier, 1836

Material examined: 2 females, India, Jammu & Kashmir, Kathua, Nagrota Gujroo, 32.643° N, 75.391° E, 768 m, 15.ix.2019 (Reg. No. ZOO246.1, ZOO246.2); 1 female, India, Jammu & Kashmir, Jammu, Talab Tillo, 32.722° N, 74.837° E, 287 m, 22.ix.2021 (Reg. No. ZOO246.3); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.608° N, 75.288° E, 449 m, 4.xi.2021 (Reg. No. ZOO246.4).

Distribution in India: Arunachal Pradesh, Assam, Jammu & Kashmir, Sikkim, and West Bengal.

Subfamily Eumeninae Latreille, 1802**Genus *Antepipona*** de Saussure, 1855***Antepiporia bipustulata*** de Saussure, 1856

Material examined: 1 male, India, Jammu & Kashmir, Kathua, Ramkot, 32.641° N, 75.343° E, 666 m, 30.x.2019 (Reg. No. ZSI/WGRC/IR/INV.23171); 2 males, India, Jammu & Kashmir, Rajouri, Sunderbani, 33.049° N, 74.490° E, 576 m, 08.ix.2022. (Reg. No. ZOO261.1, ZOO261.2).

Distribution in India: Arunachal Pradesh, Chhattisgarh, Jammu & Kashmir (new record), Meghalaya, Nagaland.

Genus *Antodynerus* de Saussure, 1855***Antodynerus limbatus*** de Saussure, 1852

Material examined: 2 females, India, Jammu & Kashmir, Kathua, Ramkot, 32.608° N, 75.278° E, 449 m, 24.x.2019 (Reg. No. ZOO247.1, ZOO247.2); 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.610° N, 75.278° E, 500 m, 06.viii.2020 (Reg. No. ZOO247.3); 2 females, India, Jammu & Kashmir, Rajouri, Sunderbani, 33.049° N, 74.490° E, 576 m, 01.ix.2022 (Reg. No. ZOO247.4).

Distribution in India: Andhra Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir (new record), Gujarat, Kerala, Maharashtra, Tamil Nadu, and West Bengal.

Genus *Delta* de Saussure, 1855***Delta pyriforme pyriforme*** Fabricius, 1775

Material examined: 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.608° N, 75.278° E, 449 m, 24.x.2019 (Reg. No. ZOO248.1).

Distribution in India: Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Delhi, Gujarat, Himachal Pradesh, Jammu & Kashmir (new record), Jharkhand, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Pondicherry, Rajasthan, Sikkim, Tamil Nadu,

Tripura, Uttarakhand, Uttar Pradesh, and West Bengal.

Genus *Rhynchium* Spinola, 1806***Rhynchium brunneum*** Spinola, 1808

Material examined: 2 females, India, Jammu & Kashmir, Kathua, Ramkot, 32.608° N, 75.278° E, 449 m, 20.viii.2020 (Reg. No. ZOO249.1, ZOO249.2); 1 female, India, Jammu & Kashmir, Jammu, R.S. Pura, 32.604° N, 74.731° E, 272 m, 20.xii.2020 (Reg. No. ZOO249.3).

Distribution in India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Himachal Pradesh, Jammu and Kashmir (new record), Karnataka, Maharashtra, Madhya Pradesh, Odisha, Tamil Nadu, and West Bengal.

Subfamily Polistinae Latreille, 1802**Tribe Polistini** Latreille, 1802**Genus *Polistes*** Latreille, 1802***Polistes indicus*** Stofa, 1934

Material examined: 1 female, India, Jammu & Kashmir, Jammu, Gandhi Nagar, 32.701° N, 74.859° E, 302 m, 30.v.2022 (Reg. No. ZOO250.1).

Distribution in India: Jammu & Kashmir (new record).

Polistes olivaceus de Geer, 1773

Material examined: 2 females, India, Jammu & Kashmir, Ramkot, 32.604° N, 75.288° E, 516 m, 25.viii.2019 (Reg. No. ZOO251.1); 1 female, India, Jammu & Kashmir, Jammu, Akhnoor, 32.899° N, 74.742° E, 330 m, 28.viii.2020 (Reg. No. ZOO251.2); 1 female, India, Jammu & Kashmir, Jammu University, Botanical Garden, 32.719° N, 74.868° E, 314 m, 28.ix.2020 (Reg. No. ZOO251.3).

Distribution in India: Andhra Pradesh, Arunachal Pradesh, Assam, Gujarat, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Odisha, Rajasthan, Sikkim, Tripura, Uttarakhand, Uttar Pradesh, and West Bengal.

Polistes quadricingulatus Gusenleitner, 2006

Material examined: 2 females, India, Jammu & Kashmir, Kishatwar, 33.322° N, 75.776° E, 1801 m, 22.vii.2022 (Reg. No. ZOO252.1, ZOO252.2).

Distribution in India: Jammu & Kashmir, Uttar Pradesh.

Polistes watti Cameron 1900

Material examined: 1 female, India, Jammu & Kashmir, Jammu, University of Jammu, Botanical garden, 32.719° N, 74.868° E, 314 m, 24.xii.2020 (Reg. No.

ZOO253.1).; 2 females, India, Jammu & Kashmir, Samba, Vijaypur, 32.705° N, 75.888° E, 341 m, 06.xi.2021 (Reg. No. ZOO253.2, ZOO253.3); 1 female, India, Jammu & Kashmir, Rajouri, Sunderbani, 33.049° N, 74.490° E, 576 m, 05.v.2022 (Reg. No. ZOO253.4); 2 females, India, Jammu & Kashmir, Jammu, R.S. Pura, 32.604° N, 74.731° E, 272 m, 07.v.2022 (Reg. No. ZOO253.5, ZOO254.6); 2 females, 1 male, Jammu & Kashmir, Jammu, Arnia, 32.519° N, 74.799° E, 271 m, 08.v.2022 (Reg. No. ZOO253.7, ZOO253.8, ZOO253.9); 1 female, Jammu & Kashmir, Jammu, Kotbalwal, 32.733° N, 74.876° E, 309 m, 10.v.2022 (Reg. No. ZOO253.10); 1 female, Jammu & Kashmir, Kathua, 32.385° N, 75.518° E, 348 m, 24.iv.2022 (Reg. No. ZOO253.11).

Distribution in India: Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Meghalaya, Orissa, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand, West Bengal.

Tribe Ropalidiini Guerin-Meneville, 1831

Genus Ropalidia Guerin-Meneville, 1831

Ropalidia brevita Das & Gupta, 1989

Material examined: 2 females, 1 male, India, Jammu & Kashmir, Kathua, Ramkot, 32.604° N, 75.288° E, 516 m, 25.viii.2019 (Reg. No. ZOO254.1, ZOO254.2); 1 female, Jammu & Kashmir, Kathua, Ramkot, 32.604° N, 75.288° E, 516 m, 17.v.2022 (Reg. No. ZOO254.3); 2 females, Jammu & Kashmir, Punch, Mendhar, 33.605° N, 74.143° E, 938 m, 01.v.2022 (Reg. No. ZOO254.4, ZOO254.5).

Distribution in India: Assam, Delhi, Goa, Haryana, Himachal Pradesh, Jammu & Kashmir (new record), Orissa, Rajasthan, Sikkim, Uttarakhand, Uttar Pradesh, and West Bengal.

Unidentified Species:

Family Mutillidae Latreille, 1802

Subfamily Mutillinae Latreille, 1802

Genus Promecilla Andre, 1902

Material examined: 2 males, India, Jammu & Kashmir, Udhampur, 32.641° N, 75.141° E, 680 m, 07.vii.2022; 1 female, India, Jammu & Kashmir, Kathua, Ramkot, 32.641° N, 75.343° E, 666 m, 12.ix.2022 (Reg. No. ZOO259.1).

Family Pompilidae Latreille, 1804

Material examined: 1 female, India, Jammu & Kashmir, Jammu, University of Jammu, Department of Zoology, 32.724° N, 74.866° E, 316 m, 08.iv.2022 (Reg. No. ZOO242.1).

There are 14 species which are first records from

Jammu region: *Aenictus aitkeni*, *Antepipona bipustulata*, *Antodynerus limbatus*, *Camponotus pennsylvanicus*, *Chalybion bengalense*, *Delta pyrifforme pyrifforme*, *Dorylus laevigatus*, *Indodynerus capitatus*, *Polistes indicus*, *Rhynchium brunneum*, *Ropalidia brevita*, *Sceliphron madraspatanum*, *Vespa basalis*, and *Vespa tropica*.

DISCUSSION

Similar studies were conducted by various works in different parts of Jammu & Kashmir. Saini et al. (2012) investigated the species diversity of bumblebees from Jammu, Kashmir, and Ladakh provinces. During the study, they found across various species of bumble bees with four first records from the region namely, *Bombus cornutus*, *B. partthenius*, *B. miniatus*, and *B. morawitzianus*. The species *Bombus morawitzianus* was also the first record from the nation during their study. studied the insect community of Hirpora Wildlife Sanctuary, Jammu and Kashmir and found that the Hymenoptera is the second most diverse insect order in the region after Lepidoptera. Rajmohana et al. (2018) recorded 3,054 species of Hymenoptera from the Himalayan biogeographic zone and the ZSI published their findings. Wachkoo et al. (2020) was the first to record the inventory of ants' species from Jammu & Kashmir based on the museum collections and scientific literature. Their studies recorded 198 ants belonging to 54 genera from the region. Rameshkumar et al. (2024) has also made the inventory of Hymenoptera species from Jammu & Kashmir and provided a list of 764 species from the state.

Various workers studied the diversity of the order Hymenoptera from different regions of the country. The region-specific studies collectively establish that Hymenoptera diversity varies significantly across biogeographic zones, land-use types, and states in India.

Badwaik (2022) prepared a comprehensive list of ant species from Wardha District of Maharashtra and recorded 57 species belonging to 30 genera and six subfamilies. Gawas & Gupta (2022) compared the diversity of Vespidae wasps in the forest and agroecosystem of Western Ghats region of Goa. They found that the forest ecosystem is rich in diversity of Vespidae with 125 individuals belonging to 19 species and 12 genera while 106 individuals belonging to 13 species and seven genera were recorded from agroecosystems, showing the influence of habitat type on species richness.

The studies are notable for their coverage of semi-

1. *Apis cerana*2. *Apis dorsata*3. *Apis mellifera*4. *Bombus haemorrhoidalis*5. *Xylocopa fenestrata*6. *Xylocopa pubescens*7. *Tachysphex* species8. *Tachytes* species9. *Halictus vicinus*10. *Megachile lanata*11. *Chalybion bengalense*12. *Sceliphron madraspatanum*13. *Evania appendigaster*14. *Promecilla* species15. *Pompilidae* species

Image 1–15. Pictures of the observed hymenopteran species. © Authors.

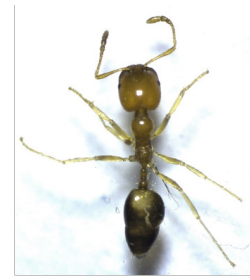
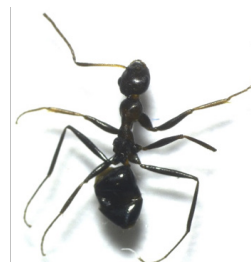
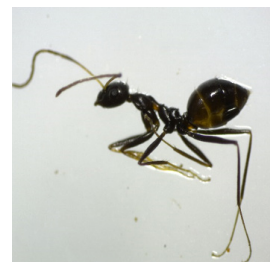
16. *Tapinoma melanocephalum*17. *Aenictus aitkeni*18. *Dorylus laevigatus*19. *Camponotus compressus*20. *Camponotus pennsylvanicus*21. *Camponotus* species22. *Polyrhachis lacteipennis*23. *Formica clara*24. *Pheidole indica*25. *Tetramorium similimum*26. *Trichomyrmex aberrans*27. *Trichomyrmex destructor*28. *Trichomyrmex scabriceps*29. *Myrmica aimonissabaudiae*30. *Lepisiota integra*31. *Lepisiota sericea*32. *Monomorium indicum*33. *Myrmecaria brunnea*34. *Messor himalayanus*

Image 16–34. Pictures of the observed hymenopteran species. © Authors.

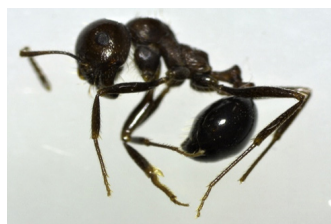
35. *Messor instabilis*36. *Leptogenys diminuta*37. *Odontoponera denticulate*38. *Tetraponera rufonigra*39. *Indodynerus capitatus*40. *Vespa basalis*41. *Vespa tropica*42. *Vespa velutina*43. *Antodynerus limbatus*44. *Delta pyriforme pyriforme*45. *Antepipona bipustulata*46. *Rhynchium brunneum*47. *Polites indicus*48. *Polistes olivaceus*49. *Polistes quadricingulatus*50. *Polistes watti*51. *Ropalidia brevita*

Image 35–51. Pictures of the observed hymenopteran species. © Authors.

evergreen forest ecosystems, arid & semi-arid landscapes and highlights the species richness of hymenopterans in western India.

The study documented 50 species across 21 families and 42 genera, indicating a rich and diverse hymenopteran fauna in the northeastern plains. Minz et al. (2024) prepared an annotated checklist from the Chattisgarh region and documented the diversity of Chalcididae in the region, contributed to the understanding of parasitoid wasp distribution. In this way, the studies well explained the diversity of Hymenopterans in the Eastern and Northeastern region of India.

Jangra et al. (2022) conducted a study on the semi-arid Green park area of Hisar region in Haryana and documented nine ant species representing seven genera and three subfamilies, highlighting the adaptability of ants in diverse habitats. The studies cover the Southern and Northern regions of the India.

The analysis of different region-specific studies provides a more informed and comparative analysis of hymenopteran diversity and underscores the importance of localized surveys in understanding the distribution patterns and ecological roles of hymenopteran insects. The findings of the current study from the Jammu region contribute to this growing knowledge and highlight the need for continued research in the region.

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Journal of Threatened Taxa is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64



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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

January 2026 | Vol. 18 | No. 1 | Pages: 28151–28262

Date of Publication: 26 January 2026 (Online & Print)

DOI: 10.11609/jott.2026.18.1.28151-28262

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