

Annotated checklist of predators and parasitoids of aphids (*Hemiptera: Aphididae*) infesting radish, *Raphanus sativus* L. (Brassicaceae) and their distribution in India

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Abstract

Raphanus sativus L. is an important brassica vegetable crop in India that is attacked by several aphid species, causing considerable yield losses. The present study compiles published information on the natural enemies of radish-infesting aphids and their tri-trophic associations in India. A total of 31 predator species belonging to five orders and nine families and five parasitoid species belonging to two families were documented. Coleoptera (Coccinellidae) was the dominant predator order (13 species), followed by Diptera (Syrphidae) (10 species), Araneae (5 species), Neuroptera (3 species), and Hemiptera (1 species). *Coccinella transversalis*, *Allograpta javana*, and *Episyrphus balteatus* were the most widespread predators, while *Diaeretiella rapae* was the predominant parasitoid. A total of 57 predator-mediated tri-trophic associations were recorded, with Maharashtra, Himachal Pradesh, and Uttarakhand representing the richest documented regions. Among the aphids, *Lipaphis erysimi* supported the highest predator diversity, whereas *Myzus persicae* harboured the greatest parasitoid richness. The limited parasitoid records from only five states indicate inadequate documentation rather than low diversity. This study provides the first comprehensive synthesis of predator- and parasitoid-mediated tri-trophic associations of radish aphids in India and establishes a baseline for future biodiversity studies, conservation biological control, and integrated pest management of aphids in radish agroecosystems.

Keywords: *Raphanus sativus*, aphids, aphidophagous predators, aphid parasitoids, tri-trophic associations, *Diaeretiella rapae*, biological control, integrated pest management

Introduction

Radish (*Raphanus sativus* L.) (Family: Brassicaceae) is an economically important root vegetable cultivated across temperate, subtropical, and tropical regions of the world. In India, it is predominantly cultivated during the winter (rabi) season; however, under irrigated conditions and with suitable cultivars, production is possible throughout much of the year in several agro-climatic regions owing to its short crop duration, high yield potential, and broad environmental adaptability [20, 41]. The major radish producing states include Bihar, Gujarat, Haryana, Punjab, Uttar Pradesh, Uttarakhand, and West Bengal. The crop is valued for its fleshy edible roots, tender leaves, and seed pods, which are consumed as vegetables, salads, and pickles. Radish is an excellent source of dietary fibre, vitamin C, folates, potassium, calcium, phosphorus, and numerous phytochemicals, including glucosinolates, isothiocyanates, anthocyanins, and phenolic compounds that possess antioxidant, antimicrobial, anti-inflammatory, hepatoprotective, antidiabetic, and anticancer properties [14, 27, 28]. Radish has long been employed in traditional medicine for the management of various ailments, including whooping cough, tuberculosis, constipation (owing to its mild laxative effect), asthma, and pain, attributable in part to its antioxidant and analgesic properties. It has also been traditionally used to facilitate the management of kidney and bladder stones and has been associated with hypocholesterolemic effects [19]. Consequently, radish contributes significantly to nutritional security, human health, and the vegetable economy of India.

Despite its economic importance, radish is attacked by a wide range of insect pests throughout its growth period. Among these, aphids are the most destructive sap-feeding insects, causing direct damage through phloem feeding and indirect losses by transmitting plant viruses, producing honeydew that promotes sooty mould development, and reducing the marketability and yield of roots and foliage [8, 51]. The cabbage aphid, *Brevicoryne brassicae* (Linnaeus), mustard aphid, *Lipaphis erysimi* (Kaltenbach), and green peach aphid, *Myzus persicae* (Sulzer), are the principal aphid species infesting radish and other cruciferous vegetables in India [47].

Natural enemies constitute one of the most important ecological regulators of aphid populations in crucifer ecosystems. Predatory coccinellid beetles, syrphid flies, lacewings, anthocorid bugs, spiders, and parasitoids, particularly members of the subfamily Aphidiinae, suppress aphid populations naturally and reduce dependence on insecticides [21, 29, 36, 50]. Among parasitoids, *Diaeretiella rapae* (McIntosh) is recognised as the most effective and widely distributed biological control agent of crucifer aphids worldwide [49, 58]. Conservation of these natural enemies forms an essential component of integrated pest management programmes in brassica crops.

Although numerous studies have documented the natural enemies of aphids on economically important brassica crops such as cabbage, cauliflower, mustard, and rapeseed in India, information specifically relating to radish remains scattered across diverse taxonomic, ecological, and agricultural publications. A comprehensive synthesis of

predator and parasitoid diversity, their host associations, and geographical distribution on aphids infesting radish has not previously been available. The present study therefore compiles and critically reviews published records of aphidophagous predators and parasitoids associated with aphids on *Raphanus sativus* in India, providing a baseline for biodiversity assessment, conservation biological control, and future integrated pest management programmes.

Materials and methods

The present study was based on an extensive review of published literature on the natural enemies (predators and parasitoids) of aphids infesting radish (*Raphanus sativus*) in India. Relevant information was compiled from peer-reviewed research articles, books, monographs, technical bulletins, and other authenticated scientific publications. Records of aphid species, predators, parasitoids, host plants, and their geographical distribution were extracted and critically evaluated. The validity of the scientific names and current taxonomic status of aphids, predators, parasitoids, and host plants were verified using standard taxonomic catalogues, recent revisions, and authoritative online databases [57]. Invalid names, synonyms, duplicate records, and misidentifications were corrected or excluded. The validated records were then analysed to determine the diversity, host plant associations, geographical distribution, and tri-trophic relationships among aphids, their natural enemies, and radish in India.

Results and discussion

Predators of aphids infesting radish

A total of 31 predator species belonging to five orders and nine families were recorded preying on 4 species of aphids infesting radish (*Raphanus sativus*) and were distributed across 14 states and union territories of India (Table 1). Coleoptera constituted the most species-rich order with 13 species (41.9%), represented exclusively by the family Coccinellidae, followed by Diptera with 10 species (32.3%) belonging to the family Syrphidae (Figure 1). Araneae comprised 5 species distributed among 4 families, whereas Neuroptera was represented by two species belonging to Chrysopidae and Hemerobiidae. Hemiptera was the least represented order with only one species of Geocoridae.

Table 1: Number of species of predators belonging to different taxa preying on different species of aphids infesting radish and their distribution across states and union territories (UT) of India

Orders	Number of			
	Families	Predator species	Aphid species	States/UT
Araneae	4	5	2	2
Coleoptera	1	13	4	9
Diptera	1	10	3	7
Hemiptera	1	1	1	1
Neuroptera	2	2	3	4
Total	9	31	4	14

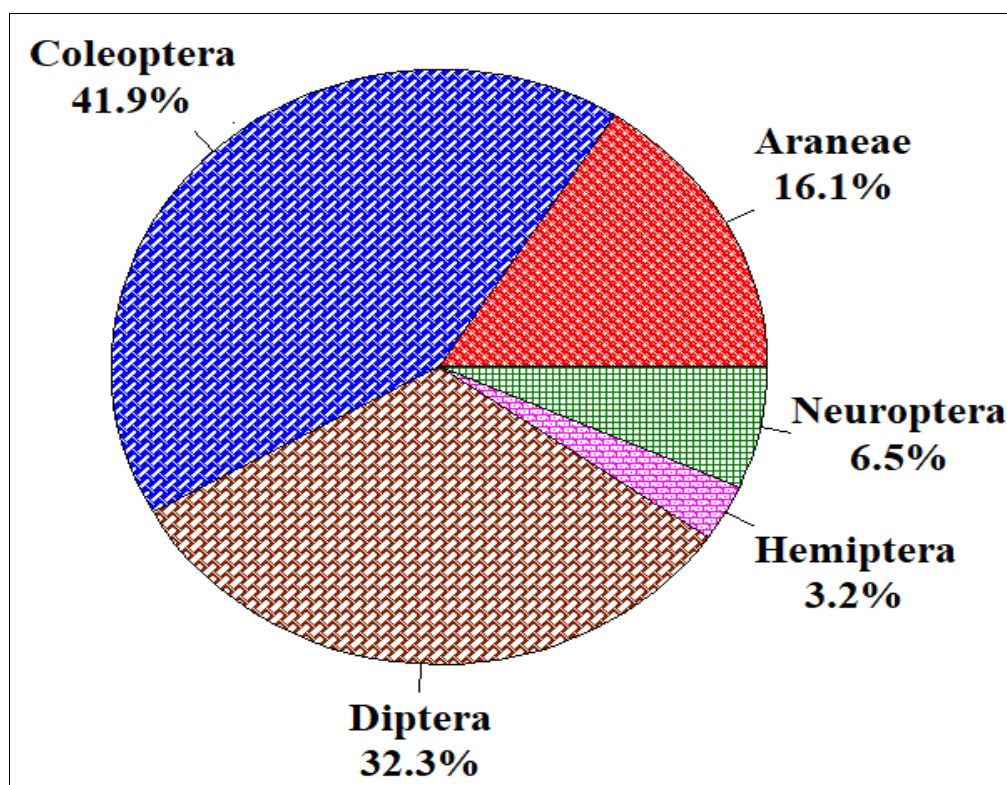


Fig 1: Percentage of order of arthropod predators of aphids infesting radish belonging to different orders in India

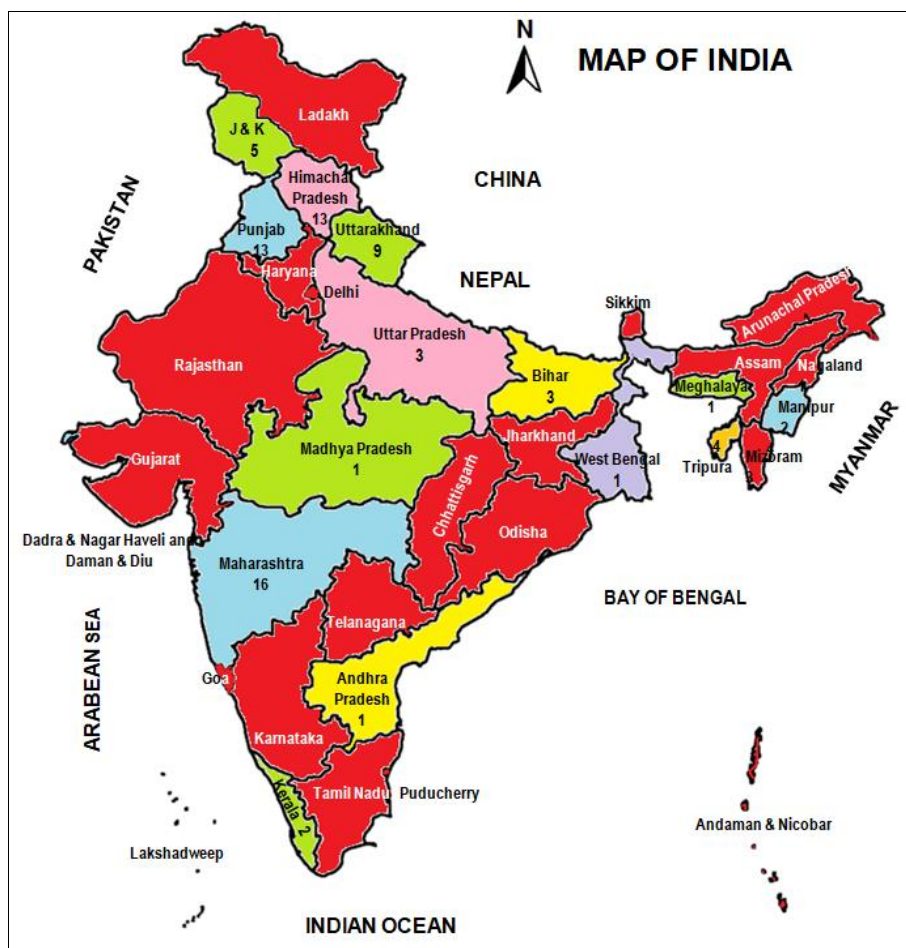


Fig 2: Map of India showing the number of tri-trophic associations (TTAs) involving predators of aphids infesting radish across different states and union territories. No predator species associated with aphids infesting radish has been recorded from the red-shaded states and union territories

The predators belonging to the order Araneae (spiders) were represented by five species, each recorded from a single aphid species and a single state/UT, indicating their sporadic documentation in association with aphids infesting radish (Table 2).

Table 2: Number of species of spiders (Araneae) belonging to different families preying on different species of aphids infesting radish and their distribution across states and union territories of India

Order/Family	Species of the predators	Number of	
		Aphid species	States/UT
Lycosidae	<i>Pardosa pseudoannulata</i>	1	1
	<i>Wadicosa fidelis</i>	1	1
Philodromidae	<i>Philodromus decoratus</i>	1	1
Salticidae	<i>Plexippus paykulli</i>	1	1
Thomisidae	<i>Thomisus projectus</i>	1	1
Subtotal		2	2

A total of 13 species of ladybird beetles (Coleoptera: Coccinellidae) were recorded preying on aphids infesting radish (*Raphanus sativus*) in India, collectively associated with four aphid species and distributed across nine states and union territories (Table 3). *Coccinella transversalis* was the most widely distributed species, occurring on three aphid species across six states, followed by *Coccinella septempunctata*, which was associated with two aphid species in five states, and *Cheilomenes sexmaculata*, recorded on two aphid species across four states. *Propylea*

dissecta and *Propylea luteopustulata* were each associated with two aphid species and recorded from two states. The remaining species were recorded from a single aphid species and a single state.

Table 3: Species of ladybirds (Coleoptera: Coccinellidae) preying on aphids infesting radish and their distribution across states and union territories of India.

Species of the ladybird predators	Number of	
	Aphid species	States/UT
<i>Cheilomenes sexmaculata</i>	2	4
<i>Chilocorus infernalis</i>	1	1
<i>Coccinella luteopicta</i>	1	1
<i>Coccinella septempunctata</i>	2	5
<i>Coccinella transversalis</i>	3	6
<i>Hippodamia variegata</i>	1	1
<i>Megalocaria dilatata</i>	1	1
<i>Priscibrum uropygialis</i>	1	1
<i>Propylea dissecta</i>	2	2
<i>Propylea luteopustulata</i>	2	2
<i>Scymnus coccivora</i>	1	1
<i>Scymnus loewii</i>	1	1
<i>Scymnus nubilus</i>	1	1
Total	4	9

A total of 10 species of hover flies (Diptera: Syrphidae) were recorded preying on aphids infesting radish (*Raphanus sativus*) in India, collectively associated with three aphid species and distributed across only seven states and union territories (Table 4). *Allograpta javana* was the most

widespread species, occurring on three aphid species across four states, followed by *Episyrphus balteatus*, which was likewise associated with three aphid species but recorded from three states. *Ischiodon scutellaris*, *Eupeodes confrater*, and *Scaeva pyrastris* each preyed on two aphid species, whereas the remaining hover fly species exhibited comparatively restricted host associations and geographical distributions, being recorded from only one or two aphid species and confined to a single state. These results indicate that *Allograpta javana* and *Episyrphus balteatus* constitute the most widespread syrphid predators associated with radish aphids in India.

Table 4: Species of hover flies (Diptera: Syrphidae) preying on different species of aphids infesting radish and their distribution across states and union territories of India.

Species of the hover fly predators	Number of	
	Aphid species	States/UT
<i>Allograpta javana</i>	3	4
<i>Betasyrphus serarius</i>	1	1
<i>Episyrphus balteatus</i>	3	3
<i>Eupeodes confrater</i>	2	2
<i>Eupeodes corollae</i>	2	1
<i>Ischiodon scutellaris</i>	2	3
<i>Scaeva latimaculata</i>	1	1

Table 5: Species of lacewings (Neuroptera) preying on different species of aphids infesting radish and their distribution across states and union territories of India.

Families	Species of the lacewing predators	Number of	
		Plant species	States/UT
Chrysopidae	<i>Chrysoperla zastrowi sillemi</i>	2	3
Hemerobiidae	<i>Micromus timidus</i>	1	1
Total		4	4

Among the aphid species, *Lipaphis erysimi* supported the richest predator assemblage, with 21 predator species forming 27 TTAs distributed across nine states, followed by *Myzus persicae*, which was associated with 11 predator species and 16 TTAs in seven states (Table 6). *Brevicoryne brassicae* was preyed upon by nine predator species, forming 10 TTAs across three states, whereas *Lipaphis*

<i>Scaeva pyrastris</i>	2	2
<i>Scaeva selenitica</i>	1	1
<i>Syrphus torvus</i>	1	1
Total	3	7

Only one species of aphidophagous bugs (*Hemiptera*) *Geocoris ochropterus* belonging to the family Geocoridae was recorded preying on only *Lipaphis erysimi* on radish in Maharashtra indicating a highly restricted association and geographical distribution. Thus, *Hemipteran* predators constituted a minor component of the aphidophagous predator complex associated with radish in India.

A total of two species of lacewings (Neuroptera) belonging to two families, Chrysopidae and Hemerobiidae, were recorded preying on aphids infesting radish (*Raphanus sativus*) in India (Table 5). These species were collectively associated with four aphid species and distributed across four states and union territories. *Chrysoperla zastrowi sillemi* occurs on two aphid species and recorded from Jammu & Kashmir, Madhya Pradesh and Maharashtra, whereas *Micromus timidus* (Hemerobiidae) was associated with a single aphid species and confined to only Uttarakhand. These findings indicate that lacewings constitute a relatively minor but important component of the natural enemy complex of radish aphids in India.

pseudobrassicae was associated with only four predator species, each representing a single tri-trophic association confined to one state. These results indicate that *Lipaphis erysimi* supports the greatest diversity and geographical distribution of aphidophagous predators on radish in India, highlighting its importance in sustaining natural enemy communities within radish agroecosystems.

Table 6: Number of predator species associated with aphids infesting radish and their distribution across states and union territories of India.

Aphid species	Number of		
	Species of predators	Tritrophic associations	States/UT
<i>Brevicoryne brassicae</i>	9	10	3
<i>Lipaphis erysimi</i>	21	27	9
<i>Lipaphis pseudobrassicae</i>	4	4	1
<i>Myzus persicae</i>	11	16	7
Total	31	57	14

The observed pattern of predator-mediated tri-trophic associations (TTAs) on radish reflects both the distribution of aphid pests and the uneven documentation of their natural enemies across India. The predominance of coccinellid beetles and syrphid flies corroborates their well-established role as the principal aphid predators in brassica agroecosystems owing to their broad prey range and high predation efficiency [21, 29]. The concentration of TTAs in Maharashtra and the northwestern Himalayan states, particularly Himachal Pradesh and Uttarakhand, is consistent with extensive radish cultivation and greater entomological investigations in these regions, whereas the few records from several other states are more likely

attributable to inadequate sampling than to low predator diversity.

Although West Bengal ranks among the leading radish-producing states in India, relatively few published records are available on aphid predator assemblages associated with the crop. This discrepancy is unlikely to indicate a genuine scarcity of natural enemies but may instead reflect limited faunistic surveys and taxonomic investigations targeting aphidophagous predators in radish agroecosystems within the state. Furthermore, the widespread adoption of intensive vegetable cultivation practices, including frequent insecticide applications, may suppress predator populations and reduce their field abundance. Habitat simplification,

continuous monocropping, and reduced availability of flowering resources in intensive vegetable production systems may further limit the diversity and persistence of aphidophagous predators by reducing alternative prey, nectar, and pollen resources required by many beneficial insects, particularly hover flies and lacewings [35]. Consequently, the currently available records from West Bengal are more likely to represent an underestimation of the actual predator diversity than the true ecological status of aphid natural enemies in radish fields.

Among the aphids, *Lipaphis erysimi* supported the richest predator assemblage, followed by *Myzus persicae*, reflecting their widespread occurrence and economic importance on cultivated brassicas [42, 43, 44]. In contrast, the comparatively fewer predator records for *Brevicoryne brassicae* and *Lipaphis pseudobrassicae* probably represent limited documentation rather than true ecological scarcity [30, 42]. The widespread occurrence of *Coccinella septempunctata*, *Coccinella septempunctata*, *Cheilomenes sexmaculata*, *Allograpta javana*, and *Episyrphus balteatus* further highlights their importance as key biological control agents of radish aphids [45, 46, 48, 54]. Conversely, spiders, lacewings, and Hemipteran predators were represented by relatively few records, suggesting that these groups remain under-sampled despite their recognised contribution to aphid suppression [52, 55, 56]. Overall, the available records indicate that the diversity of predator-aphid-radish interactions in India is still incompletely documented, underscoring the need for systematic surveys, particularly in poorly explored regions.

The detailed account of predators of aphids infesting radish across Indian states and union territories is given below.

Order: Araneae

a. Family: Lycosidae

1. *Pardosa pseudoannulata* (Bösenberg & Strand, 1906)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Maharashtra [38]

2. *Wadicosa fidelis* (O. Pickard - Cambridge, 1872)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Maharashtra [38]

b. Family: Philodromidae

1. *Philodromus decoratus* Tikader, 1962

- *Brevicoryne brassicae* (Linnaeus, 1758) - Himachal Pradesh [10]

c. Family: Salticidae

1. *Plexippus paykulli* (Audouin, 1826)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Maharashtra [38]

d. Family: Thomisidae

1. *Thomisus projectus* Tikader, 1960

- *Lipaphis erysimi* (Kaltenbach, 1843) - Maharashtra [38]

Order: Coleoptera, family: Coccinellidae

1. *Cheilomenes sexmaculata* (Fabricius, 1781)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Kerala [59]; Maharashtra [38]; Uttarakhand [32]; Jammu & Kashmir [22]

2. *Chilocorus infernalis* (Mulsant, 1853)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Himachal Pradesh [40]

3. *Coccinella luteopicta* (Mulsant)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Himachal Pradesh [40]

4. *Coccinella septempunctata* Linnaeus, 1758

- *Lipaphis erysimi* (Kaltenbach, 1843) - Maharashtra [38]
- *Lipaphis erysimi* (Kaltenbach, 1843) - Manipur [11]; Tripura [15]; Uttarakhand [18]
- *Lipaphis pseudobrassicae* Davis, 1914 - Jammu & Kashmir [22]

5. *Coccinella transversalis* Fabricius, 1781

- *Brevicoryne brassicae* (Linnaeus, 1758) - Uttarakhand [18]
- *Lipaphis erysimi* (Kaltenbach, 1843) - Kerala [59]; Tripura [15]
- *Myzus persicae* (Sulzer, 1776) - Bihar [4, 31]; Himachal Pradesh [1]; West Bengal [23]

6. *Hippodamia variegata* (Goeze, 1777) [

- *Brevicoryne brassicae* (Linnaeus, 1758) - Himachal Pradesh [10]

7. *Megalocaria dilatata* (Fabricius, 1775)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Manipur [11]

8. *Priscibrumus uropygialis* (Mulsant, 1853)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Himachal Pradesh [40]

9. *Propylea dissecta* (Mulsant, 1850)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Uttar Pradesh [33]
- *Myzus persicae* (Sulzer, 1776) - Maharashtra [5]

10. *Propylea luteopustulata* (Mulsant, 1850)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Himachal Pradesh [40]
- *Lipaphis pseudobrassicae* Davis, 1914 - Jammu & Kashmir [22]

11. *Scymnus coccivora* Ayyar, 1925

- *Myzus persicae* (Sulzer, 1776) - Maharashtra [5]

12. *Scymnus loewii* Mulsant, 1850

- *Myzus persicae* (Sulzer, 1776) - Maharashtra [5]

13. *Scymnus nubilus* (Mulsant, 1850)

- *Myzus persicae* (Sulzer, 1776) - Maharashtra [5]

Order: Diptera, family: Syrphidae

1. *Allograpta javana* (Wiedemann, 1824)

- *Lipaphis erysimi* (Kaltenbach, 1843) - Tripura [3]

2. *Betasyrphus serarius* (Wiedemann, 1830)

- *Myzus persicae* (Sulzer, 1776) - Maharashtra [5]

3. *Episyrphus balteatus* (De Geer, 1776)

- *Brevicoryne brassicae* (Linnaeus, 1758) - Uttarakhand [7]
- *Lipaphis erysimi* (Kaltenbach, 1843) - Tripura [15]
- *Myzus persicae* (Sulzer, 1776) - Maharashtra [5]

4. *Eupeodes confrater* (Wiedemann, 1830)

- *Brevicoryne brassicae* (Linnaeus, 1758) - Uttarakhand [6]

- *Lipaphis erysimi* (Kaltenbach, 1843) - Tripura ^[15]
- 5. ***Eupeodes corollae* (Fabricius, 1794)**
 - *Brevicoryne brassicae* (Linnaeus, 1758) - Himachal Pradesh ^[11]
 - *Myzus persicae* (Sulzer, 1776) - Himachal Pradesh ^[11]
- 6. ***Ischiodon scutellaris* (Fabricius, 1805)**
 - *Brevicoryne brassicae* (Linnaeus, 1758) - Uttarakhand ^[17]
 - *Myzus persicae* (Sulzer, 1776) - Andhra Pradesh ^[24], Maharashtra ^[5]
- 7. ***Scaeva latimaculata* (Brunetti, 1923)**
 - *Lipaphis erysimi* (Kaltenbach, 1843) - Punjab ^[39]
- 8. ***Scaeva pyrastris* (Linnaeus, 1758)**
 - *Brevicoryne brassicae* (Linnaeus, 1758) - Himachal Pradesh ^[2]; Punjab ^[2]
 - *Myzus persicae* (Sulzer, 1776) - Himachal Pradesh ^[2]; Punjab ^[2]
- 9. ***Scaeva selenitica* (Meigen, 1822)**
 - *Brevicoryne brassicae* (Linnaeus, 1758) - Uttarakhand ^[7]
- 10. ***Syrphus torvus* Osten Sacken, 1875**
 - *Lipaphis erysimi* (Kaltenbach, 1843) - Meghalaya ^[13]

Order: Hemiptera, family: Geocoridae

1. ***Geocoris ochropterus* (Fieber, 1844)**
 - *Lipaphis erysimi* (Kaltenbach, 1843) - Maharashtra ^[38]

Order: Neuroptera

a. Family: Chrysopidae

1. ***Chrysoperla zastrowi sillemi* (Esben - Petersen, 1935)**
 - *Lipaphis erysimi* (Kaltenbach, 1843) - Maharashtra ^[38]
 - *Lipaphis pseudobrassicae* Davis, 1914 - Jammu & Kashmir ^[22]
 - *Myzus persicae* (Sulzer, 1776) - Madhya Pradesh ^[25], Maharashtra ^[5]

b. Family: Hemerobiidae

1. ***Micromus timidus* Hagen, 1853**
 - *Lipaphis erysimi* (Kaltenbach, 1843) - Uttarakhand ^[12]

Parasitoids of aphids infesting radish

A total of five species of parasitoids belonging to two families were recorded parasitising aphids infesting radish (*Raphanus sativus*) in India, collectively associated with four aphid species and distributed across five states and union territories (Table 7). Braconidae (Aphidiinae) was the dominant family, represented by four species whereas Aphelinidae (Aphelininae) was represented solely by *Aphelinus albipodus*. Among the parasitoids, *Diaeretiella rapae* was the most widespread species, parasitising two aphid species and recorded from three states, while the remaining species were each associated with a single aphid species and confined to one state.

Table 7: Species of parasitoid species associated with different species of aphids infesting radish and their distribution across states and union territories of India

Parasitoid species	Number of	
	Aphid species	States/UT
A. Family: Aphelinidae (Subfamily: Aphelininae)		
<i>Aphelinus albipodus</i>	1	1
B. Family: Braconidae (Subfamily: Aphidiinae)		
<i>Lysaphidus erysimi</i>	1	1
<i>Binodoxys indicus</i>	1	1
<i>Diaeretiella rapae</i>	2	3
<i>Praon volucre</i>	1	1
Total	4	5

The recorded parasitoids were associated with 4 species of aphids infesting radish and distributed across 5 states and union territories of India. *Myzus persicae* supported the highest parasitoid diversity, harbouring four parasitoid species recorded from two states, followed by *Brevicoryne brassicae*, which was parasitised by a single species recorded across three states. In contrast, *Lipaphis erysimi* and *Lipaphis pseudobrassicae* were each associated with only one parasitoid species, with records confined to a single state. These results indicate that *Myzus persicae* supports the richest parasitoid assemblage on radish in India, whereas the parasitoid fauna associated with *Lipaphis erysimi* and *Lipaphis pseudobrassicae* remains poorly documented.

The parasitoid fauna associated with radish-infesting aphids remains poorly documented in India, with records available from only five states and union territories. Although *Myzus persicae* harboured the highest recorded parasitoid diversity, this is likely a reflection of greater research attention rather than a genuinely richer parasitoid assemblage. Likewise, the limited records for other aphids and their parasitoids probably result from inadequate sampling rather than their absence. Given the broad host range and widespread occurrence of aphidiine parasitoids, particularly *Diaeretiella rapae* ^[49], further surveys are expected to reveal additional parasitoid species and host associations in radish agroecosystems.

The detailed account of parasitoids of aphids infesting radish across Indian states and union territories is given below.

Order: Hymenoptera

a. Family: Aphelinidae

1. ***Aphelinus albipodus* Hayat & Fatima, 1992**
 - *Myzus persicae* (Sulzer, 1776) - Bihar ^[31]

b. Family: Braconidae

1. ***Binodoxys indicus* (Subba Rao & Sharma, 1958)**
 - *Myzus persicae* (Sulzer, 1776) - Bihar ^[26]
2. ***Diaeretiella rapae* (McIntosh, 1855)**
 - *Brevicoryne brassicae* (Linnaeus, 1758) - Himachal Pradesh ^[37]; Uttar Pradesh ^[34, 53]; Uttarakhand ^[6]; Chakrabarti & Debnath, 2009)
 - *Lipaphis erysimi* (Kaltenbach, 1843) - Uttar Pradesh ^[34]
 - *Myzus persicae* (Sulzer, 1776) - Himachal Pradesh ^[37]
3. ***Lysaphidus erysimi* (Starý, 1960)**
 - *Lipaphis pseudobrassicae* Davis, 1914 - Jammu &

4. *Praon volucre* (Haliday, 1833)

- *Myzus persicae* (Sulzer, 1776) - India ^[16]

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