

## Biodiversity and Biosystematics of Ladybird Beetles (Coleoptera: Coccinellidae) in India

Prince Paul<sup>1</sup>, Kabilan M<sup>1</sup>, Veeramuthu Duraipandiyan<sup>1\*</sup>, V. Pushpa Rani<sup>2</sup>, Poothapandi Oviya<sup>3</sup>,  
D. Antony Prabhu<sup>2</sup>, Deon David<sup>2</sup>, Jofy Francis<sup>2</sup>

<sup>1</sup>Entomology Research Institute, Loyola College, Chennai 600 034, Tamil Nadu, India.

<sup>2</sup>Department of Advanced Zoology and Biotechnology, Loyola College, Chennai 600 034, Tamil Nadu, India.

<sup>3</sup>Department of Zoology, Pachaiyappa's College, Chennai 600 030, Tamil Nadu, India.

\*Corresponding author: duraipandiyan@loyolacollege.edu

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### ARTICLE DETAILS

#### Research Paper

#### Article History

Received : September 10, 2023

Accepted : September 26, 2023

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#### Keywords :

Ladybird, Natural enemies,  
Coleoptera, Biodiversity,  
Biosystematics

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### ABSTRACT

Ladybird beetles are important natural enemies which controls the pest population and increase the agricultural productivity. Ladybird beetles belong to the order coleoptera and exist all over the world. In coleoptera, there are more than 3,50,000 known species and it is one of the largest orders in animal kingdom. The distribution of various species in India are not studied well. This attempt is to study the biodiversity and biosystematics of ladybird beetles in India.

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### Introduction:

Ladybird beetle is a natural enemy that belongs to class insecta, order Coleoptera and family Coccinellidae. The coccinellid beetles exhibit various colour patterns and the size ranges from a few millimetres to almost a square-inch. They possess a very distinctive shape and are easily identifiable. These are predators which feed on other insect pests and controls the agricultural crop damage below the threshold level. The exoskeleton gives protection and provides the attachment places for muscles. It feeds on Coccids, Aphids, plant mites, eggs of many pests and other small soft bodied insects (Mushtaq et al., 2015).

**Coleoptera- A great natural enemies:**

Beetles exist in both terrestrial and aquatic environments and they are holometabolous (Bouchard et al., 2017). There are about 35 million known species which are already discovered. It is a major insect order found in animal kingdom. There are four suborders in order coleoptera. They are Adephaga, Archostemata, Myxophaga and Polyphaga. There are approximately 15 superfamilies and 165 families (Mckenna et al., 2009). Coleopterans are important natural enemies which control the pest population thereby helping the farmers by increasing the crop productivity (Lovei et al., 1996).

Some of the ground beetles belonging to order coleoptera act as bio-indicators. They have a strong coherence with the nearby environment which indicates the rich biodiversity of that particular environment (Allegro et al., 2003). They regulate the ecosystem by playing a key role in prey-predator relationship by serving as food to higher animals and act as a predator to pest insects thereby increasing the agricultural productivity (Noriega et al., 2018). They also increase the primary productivity and helps the primary consumers in the food chain (Nichols et al., 2008)

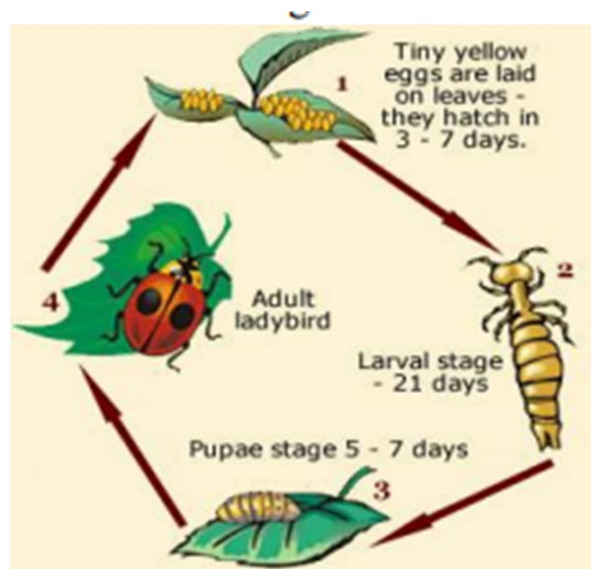


Fig:1 Life cycle of Lady bird beetles (Courtesy: <https://animalcorner.org/ladybird-lifecycle/>)

**Biodiversity of Coccinellidae:**

In the global level, there are 6,000 species under the family Coccinellidae. They are divided into 6 subfamilies, Sticholotidinae, Chilocorinae, Scymninae, Coccidulinae, Coccinellinae and Epilachninae (Kundoo et al., 2017). Ahmad Pervez et.al., has enlisted 261 Indian predaceous coccinellid species belonging to 57 genera. It supports the occurrence of many coccinellid species at a single prey site, suggesting their potential for a single prey. But, only a few of them prefer that prey and can be utilized as their efficient biocontrol agents (Pervez et al., 2004).

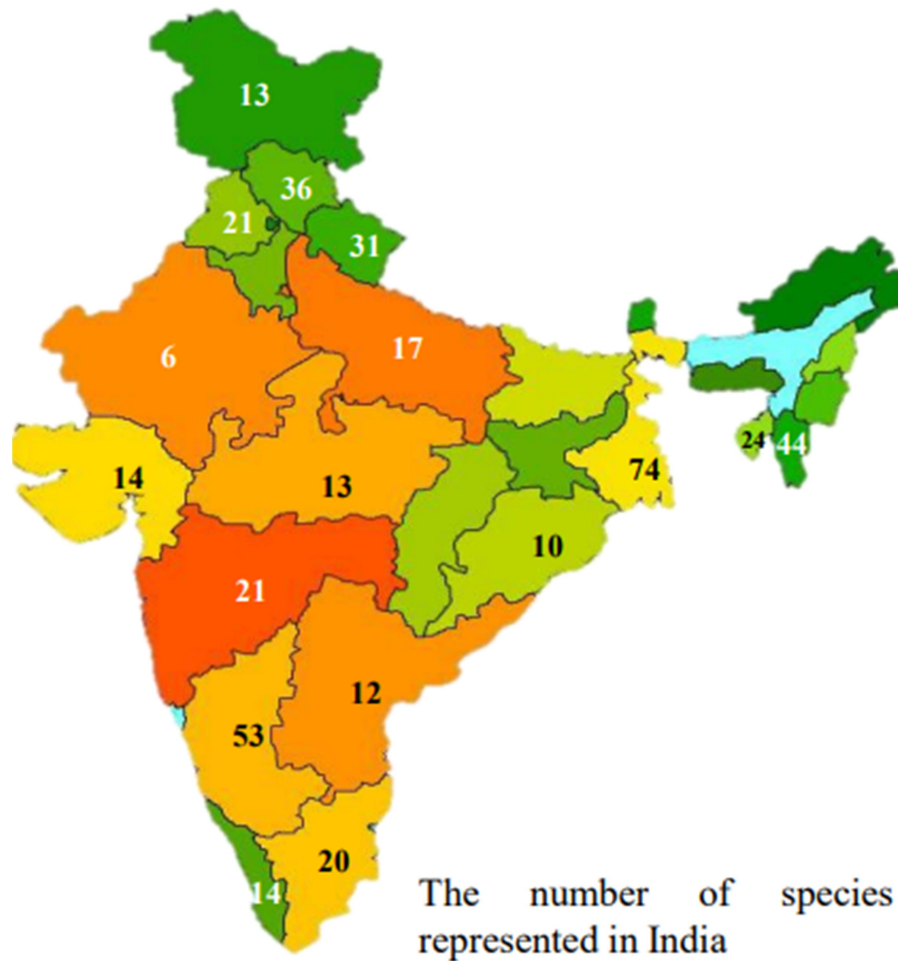


Fig:2 Biodiversity of Coccinellidae in India

The following table projects the biodiversity and distribution of various sub families of coccinellidae in India.

S.No.	Sub family	Species	Distribution
1.	Chilocorinae	<i>Brumoides suturalis</i>	Gujarat, Karnataka, Maharashtra, Manipur, Tamil Nadu, Sikkim, Meghalaya, Punjab, Tripura, West Bengal
		<i>Chilochorus nigrita</i>	Andhra Pradesh, Karnataka, Kerala, Maharashtra, Tamil Nadu
		<i>Chilochorus subindicus</i>	Kerala, Maharashtra, Tamil Nadu, Lakshadweep
2.	Coccidulinae	<i>Rodolia cardinalis</i>	Kerala, Maharashtra, Tamil Nadu
		<i>Rodolia fumida</i>	Assam, Bihar, Delhi, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Punjab, Uttar Pradesh, West Bengal, Tamil Nadu
3.	Coccinellinae	<i>Cheilomenes sexmaculata</i>	All over the country
		<i>Coccinella septempunctata</i>	All over the country
		<i>Harmonis octomaculata</i>	All over the country
		<i>Hippodamia variegata</i>	Himachal Pradesh, Jammu and Kashmir, Maharashtra, Uttar Pradesh
		<i>Illies cincta</i>	All over the country
4.	Epilachninae	<i>Henosepilachna Narayana</i>	Karnataka, Maharashtra
		<i>Henosepilachna septima</i>	All over the country
5.	Scymninae	<i>Cryptogonus orbiculus</i>	Assam, Meghalaya

		<i>Pseudaspidimerus trinotatus</i>	Andhra Pradesh, Assam, Gujarat, Kerala, Karnataka, Maharashtra, West Bengal
		<i>Scymnus nubilus</i>	Assam, Karnataka, Maharashtra, Odisha, Tamil Nadu, West Bengal, Gujarat, Lakshadweep
		<i>Stethorus pauperculus</i>	Bihar, Delhi, Karnataka, Maharashtra, Tamil Nadu
6.	Sticholotidinae	<i>Serangium parcesetosum</i>	Maharashtra, Tamil Nadu, Madhya Pradesh, Uttar Pradesh, Lakshadweep
		<i>Jauravia opaca</i>	Karnataka, Maharashtra
		<i>Jauravia simplex</i>	Andhra Pradesh, Karnataka, Maharashtra
		<i>Jauravia pallidula</i>	Maharashtra, Karnataka, Meghalaya, Tamil Nadu, West Bengal

### Conclusion:

The five subfamilies of Coccinellidae are voracious predators and prey on mealybugs, scale-insects, aphids, mites, and whiteflies, thrips, jassids, insect eggs and small larvae. Epilachninae is the only phytophagous of Coccinellidae. They help in reducing the agricultural pests and are considered very important biological control agents and help in integrated pest management.

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