BIHAR BIODIVERSITY BOARD

INTERNSHIP PROJECT WORK

TOPIC : An assessment of insect diversity in two urban parks of Patna (Navin Sinha smriti park and Veer Kunwar Singh Azadi park).

Under the Supervision of:-

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(Scientist, ICAR-NRC)

Submitted by:-

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(M.Sc. ZOOLOGY)

CANDIDATE'S DECLARATION

I Sangita kumari certify that the work embodied in the project entitled " An assessment of insect diversity in two urban parks of Patna(Navin Sinha Memorial Park and Shaheed veer kunwar singh Azadi Park). own Bonafied work carried out by me under the supervision of Dr. Ipsita Samal Scientist, ICAR-NRCMushahari, Muzaffarpur . The matter embodied I this project work has been submitted for the award of any other degree/ diploma.

I declare that I have faithfully acknowledged, given credit to and referred to the research workers where their works have been cited in the text and the body of the project work. I further certify that I have not willfully copies/lifted up some others work, para, text, data and results etc. or available at websites and included them in this internship project work and cited as my own work.

Date:

Place: Patna (signature of the candidate)

ACKNOWLEDGMENTS

I ,Sangita Kumari, sincerely express my deep gratitude to all those who have supported and guided me during the course of my internship project titled *"An Assessment of Insect Diversity in Two Urban Parks of Patna (Navin Sinha Smriti Park and Veer Kunwar Singh Azadi Park)"*.

I wish to extend my sincere gratitude to(Chairman), Shri Bharat Jyoti, for granting me the invaluable opportunity to undertake my internship under the auspices of this esteemed institution. His vision, encouragement, and support have been instrumental in facilitating a productive and enriching learning experience.

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This work would not have been possible without the collective contribution of all these individuals and institutions.

(Sangita Kumari)
Biodiversity Intern

Introduction

Urban green spaces, such as parks and gardens, play a crucial role in maintaining ecological balance within cities by supporting biodiversity and providing habitats for various organisms, including insects. Insects are among the most diverse and ecologically significant groups of organisms on Earth, contributing to essential ecosystem functions such as pollination, decomposition, nutrient cycling, and serving as a vital component of the food web. Assessing insect diversity in urban parks not only helps in understanding the health and sustainability of these ecosystems but also provides insights into the impacts of urbanization on local biodiversity.

Patna, the capital city of Bihar, has undergone rapid urban expansion in recent decades, which has resulted in significant changes to its natural landscapes. However, several urban parks continue to serve as green refuges for a wide variety of flora and fauna. Among these, **Navin Sinha Smriti Park** and **Veer Kunwar Singh Park** are important public spaces that offer vegetation cover, water sources, and microhabitats conducive to insect life. These parks differ in their vegetation composition, maintenance practices, and surrounding land use, making them ideal sites for comparative biodiversity studies.

The present study, undertaken as part of an internship project, aims to assess and compare the insect diversity of these two urban parks. This assessment will involve documenting the species richness, relative abundance, and family-level classification of the collected specimens. The findings of this research are expected to contribute to baseline data for urban biodiversity in Patna and provide valuable recommendations for park management and conservation planning.

NAVIN SINHA SMRITI PARK



Navin Sinha Smriti Park is a public park located on Shastri Nagar Road near Rajbansi Nagar in Patna, Bihar. It serves as a community green space and is named in memory of Navin Sinha, though specific details about his identity and contributions are not widely documented in public sources. The park is open to the public with a nominal entry fee of ₹5 and remains closed on Tuesdays

While comprehensive historical information about Navin Sinha Smriti Park is limited, it functions as a local recreational area for residents and visitors. For those interested in exploring more prominent historical and cultural sites in Patna, Buddha Smriti Park is a notable destination. Located near Patna Junction, Buddha Smriti Park was inaugurated by the 14th Dalai Lama on May 27, 2010, to commemorate the 2554th birth anniversary of Lord Buddha. The park features the 200-foot-high Patliputra Karuna Stupa, housing sacred relics of Lord Buddha, and includes a museum, meditation center, and a Bodhi tree sapling from Bodh Gaya.

Navin Sinha Memorial Park in Patna is a peaceful haven that beautifully blendsnatural beauty, recreation, and relaxation. With its lush greenery, vibrant flowers, and scenic walking trails, the park offers a refreshing escape from the city’s hustle. Visitors are welcomed with thoughtful amenities like

wheelchair-accessible entrances, cozy seating areas, and snack spots, making it a comfortable and enjoyable destination for all. Highly rated for its cleanliness and visitor satisfaction, the park stands out not only as a place of leisure but also as a symbol of Patna’s commitment to preserving green spaces It plays a vital role in promoting environmental awareness and supporting sustainable practices, while also offering mental and physical wellness through outdoor activities. Whether you're looking for inspiration, a calming retreat, or just a pleasant outing, Navin Sinha Memorial Park promises a memorable experience for people of all ages.

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Trialeurodes vaporarioru

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Hemiptera
- **Suborder**: Sternorrhyncha
- **Superfamily**: Aleyrodoidea
- **Family**: Aleyrodidae

Whiteflies are small, sap-sucking insects belonging to the family Aleyrodidae. Despite their name, they are not true flies but are closely related to aphids and mealybugs.

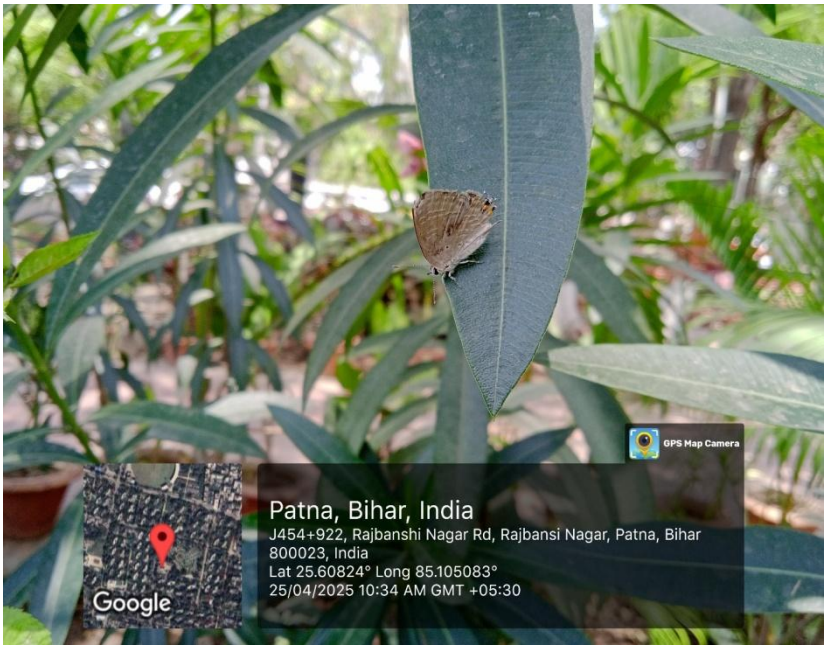
Appearance: Tiny (1–2 mm), moth-like insects with soft bodies and powdery white wings.

Behavior: They cluster on the undersides of leaves and fly up in a cloud when disturbed.

Feeding: They suck sap from plants using their needle-like mouthparts, weakening the plant and potentially transmitting viral diseases.

Reproduction: Females lay eggs on leaves, and the immature stages (nymphs) also feed on plant sap

Damage: Leaves may yellow, curl, drop prematurely, or develop sticky honeydew that attracts sooty mold.



Catochrysops strabo

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Lepidoptera
- **Family**: Lycaenidae
- **Genus**: *Catochrysops*
- **Species**: *Catochrysops strabo*

ABOUT

Catochrysops strabo, or the Forget-me-not, is a small and delicate butterfly with a wingspan of about 25–30 mm. The upper side is bluish in males and more brownish in females. The underside has fine, wavy white and brown markings, helping with camouflage. It has short tails on the hindwings, typical of many lycaenids.

Appearance:

- Small butterfly, wingspan around 25–30 mm.
- Males have violet-blue upper wings with thin black borders.
- Females are brownish with bluish or purplish tinges near the base.
- Underside is pale grey with fine white and brown line markings.

Environmental Impact

- Pollination – Adults feed on nectar from various flowers, aiding pollination in both wild and cultivated plants.
- Food Web Contribution – Acts as prey for birds, spiders, dragonflies, and other insectivores.
- Larval Feeding – Caterpillars feed mainly on legumes (*Crotalaria*, *Indigofera*, *Dolichos*).
- Crop Impact – May cause minor defoliation in legume crops; damage is usually not economically significant.
- Ecosystem Indicator – Presence indicates healthy, flower-rich habitats.



Musca domestica

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Diptera
- **Family**: Muscidae
- **Genus**: *Musca*
- **Species**: *Musca domestica*

About:

Musca domestica is the most common species of fly found in human habitats. It is a worldwide synanthropic insect, meaning it thrives in close association with humans. Though small, houseflies play a significant role in environmental hygiene and disease transmission.

Appearance:

- Size: About 6–7 mm in length.
- Color: Grayish body with four dark longitudinal stripes on the thorax.
- Eyes: Large, reddish compound eyes.
- Wings: Transparent with a single pair of functional wings and reduced hindwings (halteres) for balance.
- Mouthparts: Sponging type, adapted for liquid or semi-liquid food.

Environmental Effects

- Organic Matter Decomposition – Helps break down and recycle decaying organic waste, aiding nutrient cycling in ecosystems.

- Soil Fertility – Their activity contributes to the return of nutrients to the soil, improving soil quality.

- **Food Source** – Serves as prey for birds, reptiles, amphibians, spiders, and predatory insects, supporting biodiversity.

- **Pollination** – Occasionally visits flowers for nectar, aiding in the pollination of certain plants.

- Forensic Utility – Larval development stages help in forensic investigations for estimating time of death.



Apis mellifera

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Order: Hymenoptera

Family: Apidae

Genus: *Apis*

Species: *Apis mellifera*

About:

The Western honey bee is one of the most well-known and widely distributed bee species globally. It is famous for producing honey and beeswax and plays a vital role in pollination, supporting ecosystems and agriculture. These bees live

in large colonies with a social structure composed of a queen, workers, and drones.

Appearance:

Color**:** Golden-brown body with black stripes

- Size**:** 12–15 mm long
- Body**:** Three distinct segments — head, thorax, abdomen
- Wings**:** Two pairs of transparent wings
- Eyes: Large compound eyes and three small simple eyes
- Other features**:** Hairy body to trap pollen; long tongue for nectar

Environment impact:

- Pollination**:** Crucial for reproduction of many plants and crops
- Supports biodiversity and ecosystem stability
- Boosts agriculture**:** Enhances fruit and seed production



Polistes flavus.

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Order: Hymenoptera

Family: Vespidae

Genus: *Polistes*

Species: *flavus*

About

Yellow paper wasps are social insects known for building open, umbrella-shaped nests from a papery substance made by chewing wood fibers mixed with saliva. They are commonly seen in gardens, under eaves, and other sheltered outdoor areas.

Appearance

- Size: 1.8 to 2.5 cm long
- Color: Black and yellow striped body (sometimes with reddish or brown markings depending on the species)
- Body: Slender with a narrow "waist" (petiole) and long legs that hang when flying
- Wings: Two pairs, usually folded lengthwise when at rest

Environmental Effect

- Natural pest control: Help reduce populations of caterpillars, flies, and beetle larvae
- Pollination: Assist in pollination while feeding on nectar



Drosophila melanogaster

Classification

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Diptera
- **Family**: Drosophilidae
- **Genus**: *Drosophila*
- **Species**: *Drosophila melanogaster*

About

Drosophila melanogaster is one of the most studied organisms in genetics and developmental biology due to its simple genome, short life cycle, and ease of lab cultivation. It's also very common in homes and fruit markets, especially where ripe or fermenting fruits are present.

Appearance

- Size**:** 2–4 mm in length
- Colour: Light tan to yellowish-brown body
- Eyes: Bright red compound eyes
- Wings: Transparent, often held flat over the back

Environmental Effects

- Decomposition: Helps break down decaying organic matter.
- Research: Vital model organism in genetics, neurobiology, and developmental biology.
- Food source: Serves as prey for spiders, frogs, and small birds.

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Prosopocoilus inclinatus

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Coleoptera
- **Family:** Lucanidae
- **Genus:** Prosopocoilus
- **Species:** *Prosopocoilus inclinatus*

About:

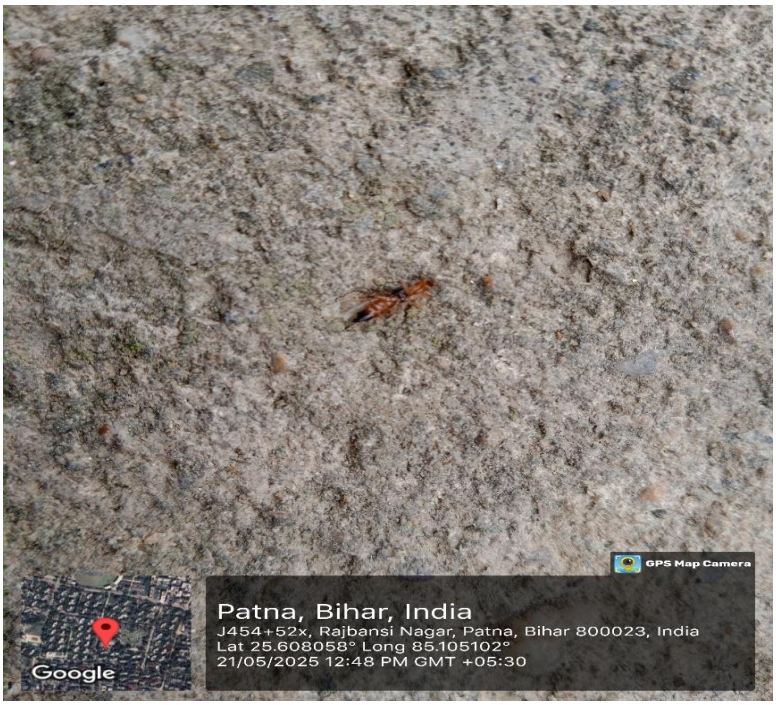
Stag beetles are large, robust beetles known for their impressive, antler-like mandibles (especially in males). They are mostly harmless to humans and play an important ecological role in decomposing wood.

Appearance:

- Males have large, antler-like jaws used for fighting.
- Females are smaller with shorter mandibles.
- Color**:** Typically dark brown or black, sometimes with reddish-brown.
- Size can range from 2.5 to 7.5 cm, depending on the species.

Environmental Effect:

- Positive impact**:** Help decompose dead wood, recycling nutrients into the soil.
- Serve as prey for birds and mammals, supporting food chains



Coptotermes formosanus

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Blattodea
- **Family:** Rhinotermitidae
- **Genus:** *Coptotermes*
- **Species:** *formosanus*

About:

Termites are social insects that live in colonies with a caste system (workers, soldiers, and reproductives). While often considered pests, they play a vital role in breaking down cellulose in dead plants and wood.

Appearance:

- Small, soft-bodied, pale or white insects.
- Workers are wingless**;** alates (reproductive termites) have two pairs of equal-length wings**.**
- Often resemble ants but have straight antennae and thicker waists.

Environmental Effect:

- Decompose dead plant material and recycle nutrients into the soil.
- Improve soil structure and fertility.



Flies Muscomorpha

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Diptera
- **Infraorder:** Muscomorpha
- **Family:** Muscidae
- **Genus:** *Musca*
- **Species:** *Musca domestica*

About:

Muscomorpha, or higher flies, include common species like houseflies, fruit flies, and blowflies. They are true flies with a single pair of wings and play diverse ecological roles—from decomposition to pollination.

Appearance:

- Small to medium-sized insects
- One pair of wings, second pair reduced to small knobs (halteres) for balance
- Large compound eyes
- Soft bodies, usually gray, black, or metallic

Environmental Effect:

- Help in decomposition and nutrient recycling
- Used in forensic science and medical treatments (maggot therapy)
- Some assist in pollination



Lasius niger

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hymenoptera
- **Family:** Formicidae
- **Genus:** *Lasius*
- **Species:** *niger*

About:

Ants are social insects known for living in organized colonies with distinct castes (workers, queens, males). There are over 12,000 known species, and they play vital roles in ecosystems.

Appearance:

- Segmented body: head, thorax, and abdomen
- Elbowed antennae
- Narrow waist (petiole)
- Colors vary: black, brown, red, yellow
- Size: 2 mm to 25 mm depending on species and caste

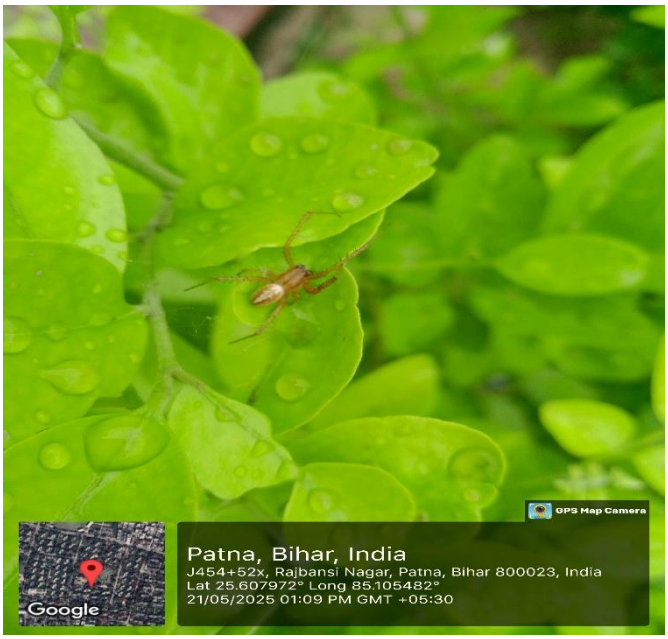
Environmental Effect:

Soil aeration and mixing

Aid in seed dispersal

Decompose organic material

Control populations of other insects



Oxyopes shweta

Classification

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Subphylum:** Chelicerata
- **Class:** Arachnida
- **Order:** Araneae
- **Suborder:** Araneomorphae
- **Family:** Oxyopidae
- **Genus:** Oxyopes
- **Species:** *Oxyopes shweta*

Oxyopes shweta is a beautiful, beneficial**,** non-aggressive spider. It plays a vital role in natural pest control, especially in Indian farms and gardens, making it a helpful ally to both farmers and the ecosystem.

Appearance

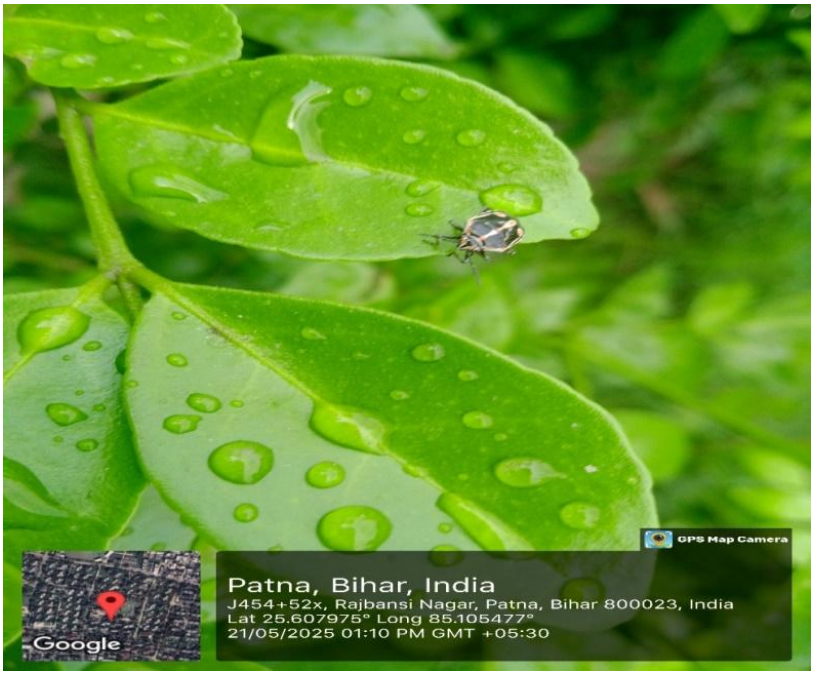
- Color**:** Pale greenish-white or creamy white with a translucent body.
- Legs: Long, spiny legs with prominent black spines. Legs are often semi-transparent.
- Body Shape**:** Slender body with a pointed abdomen and slightly raised cephalothorax.
- Size**:** Small to medium (6–9 mm in females; males are smaller).

Environmental Importance

- Natural Pest Control – Actively preys on agricultural pests such as aphids, leafhoppers, and caterpillars, reducing the need for chemical pesticides.

- Biodiversity Support – Contributes to maintaining insect population balance, preventing outbreaks of harmful species.

- Ecosystem Health Indicator – Presence in crop fields and natural vegetation reflects a healthy, pesticide-free environment.



Bagrada hilaris

Classification

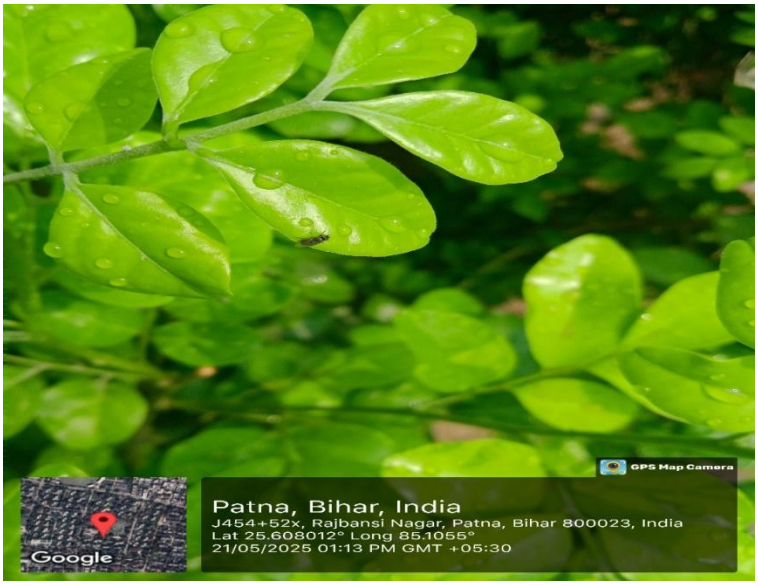
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Pentatomidae
- **Genus:** Bagrada
- **Species:** *hilaris*

Appearance

- Shape**:** Shield-like, broad body.
- Coloration: Black or dark with pale white or orange patterns — often seen in agricultural areas.
- Size**:** Around 5–15 mm depending on species.
- Legs & Antennae**:** 6 legs and long antennae; often black.

Environmental effect

- Food Source in Ecosystem – Serves as prey for birds, predatory insects, and spiders, supporting the food web.
- Biodiversity Role – Part of the natural arthropod diversity in its native range, contributing to ecosystem complexity.



Bradysia impatiens

Classification

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Diptera
- **Family:** Sciaridae
- **Genus:** Bradysia
- **Species:** *Impatiens*

ABOUT

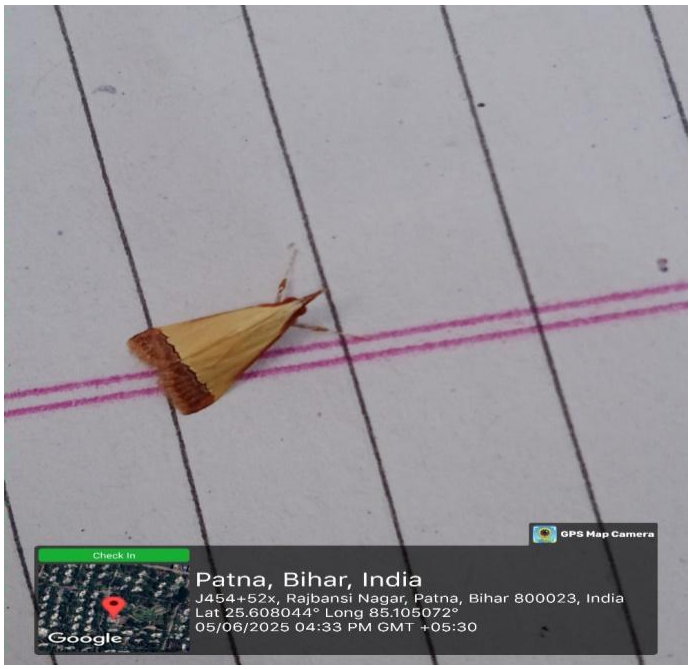
Fungus gnats are small, dark-colored flies that are commonly found in moist environments, especially around decaying organic matter**.** Though adults are harmless, their larvae can damage plant roots, especially in nurseries, potted plants, and greenhouses.

Appearance

- **Adult Size:** About 2–4 mm long.
- **Color:** Dark brown to black body with clear wings.
- **Head:** Small, with long, slender antennae nearly as long as the body.
- **Wings:** Transparent with distinctive Y-shaped vein pattern.

Environmental Effects

- Larvae may damage roots in nurseries and greenhouses.
- Can cause wilting, poor growth, and death in young plants. |



Herpetogramma licarsisalis

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Lepidoptera
- **Superfamily:** Pyraloidea
- **Family:** Crambidae
- **Subfamily:** Spilomelinae
- **Genus:** *Herpetogramma*
- **Species:** *licarsisalis*

Appearance

- Small to medium-sized moth
- Triangular folded wings
- Bright yellow forewings with reddish-brown borders
- Antennae slender, body streamlined

Environmental Effect

- Negative: Some species are agricultural pests (e.g., rice leaf folder).
- Positive: Part of the food web — prey for bats, birds, and other predators.
- Indicators of environmental change or biodiversity.



Ischnura senegalensis

Classification

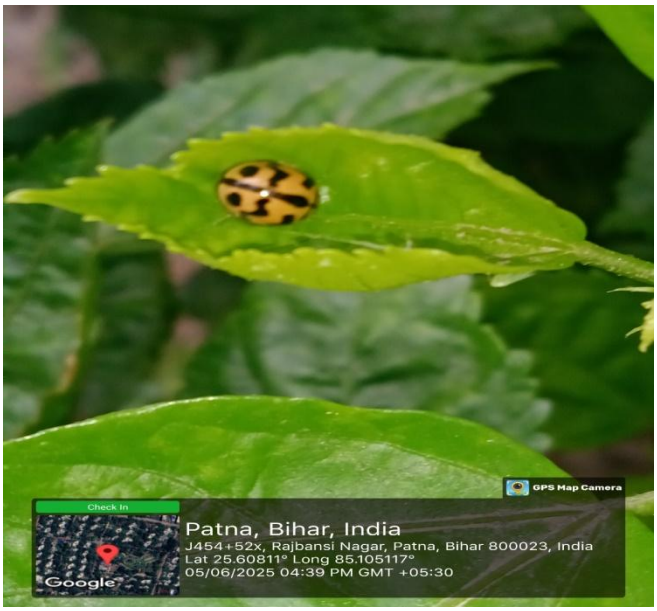
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Odonata
- **Family:** Coenagrionidae
- **Genus:** *Ischnura*
- **Species:** *Ischnura senegalensis*

Appearance

- Body Color**:** Bright metallic blue or blue-black with light blue rings or segments
- Size: 2.5 to 4.5 cm in length
- Eyes**:** Large, compound eyes on sides of the head
- Wings**:** Two pairs of transparent, narrow wings held together above the body at rest
- Abdomen**:** Long and needle-like, marked with segments

Environmental Effect

- Predator of pests: Helps control mosquito populations
- Bioindicator: Sensitive to water quality — their presence indicates a healthy aquatic ecosystem
- Food source: Preyed upon by birds, frogs, and larger insects



Epilachna vigintioctopunctata

Classification:

- Kingdom: Animalia
- Phylum**:** Arthropoda
- Class**:** Insecta
- Order**:** Coleoptera
- Family**:** Coccinellidae
- Genus**:** *Epilachna*

- Species**:** *vigintioctopunctata*

Appearance:

- Colo**r:** Yellow/orange body with distinct black spots (usually 28 spots total)
- Shape: Dome-shaped, round body
- Size**:** ~6 to 8 mm
- Antenna**e:** Short
- Legs**:** 3 pairs

Environmental Impact:

- Agricultural pest: Damages crops like solanaceous plants
- Prey: Part of the food web for birds, spiders, and other predators
- Used as an indicator of crop health and pest presence



Oxya hyla hyla

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta

- **Order:** Orthoptera
- **Family:** Acrididae
- **Genus:** Oxya
- **Species:** *Oxya hyla*

Appearance:

- Color**:** Light brown or beige, with body striping
- Shape**:** Cylindrical body, short antennae
- Legs**:** Strong hind legs adapted for jumping
- Wings**:** Incomplete in nymph stage
- Size**:** Small – growing as it molts

Environmental Role:

- Food source: For birds, reptiles, frogs
- Crop pest: In large numbers, can cause damage to rice, wheat, sugarcane, and vegetables
- Soil health contributor: As part of the detritus breakdown food chain



Atractomorpha crenulata

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda

- **Class:** Insecta
- **Order:** Orthoptera
- **Family:** Pyrgomorphidae
- **Genus:** Atractomorpha
- **Species:** *Atractomorpha crenulata*

Appearance:

- Color**:** Bright green body, blending with vegetation
- Head**:** Pointed/narrow face (hence "pointed-nose grasshopper")
- Size**:** 2–4 cm
- Wings**:** Usually folded flat along the body
- Legs**:** Strong hind legs for jumping
- Body**:** Slender and streamlined

Environmental Role:

- Part of the food chain**:** Preyed upon by birds, lizards, frogs
- Can damage crops if in high numbers
- Helps in plant matter recycling and soil turnover



Gryllus bimaculatus

Classification:

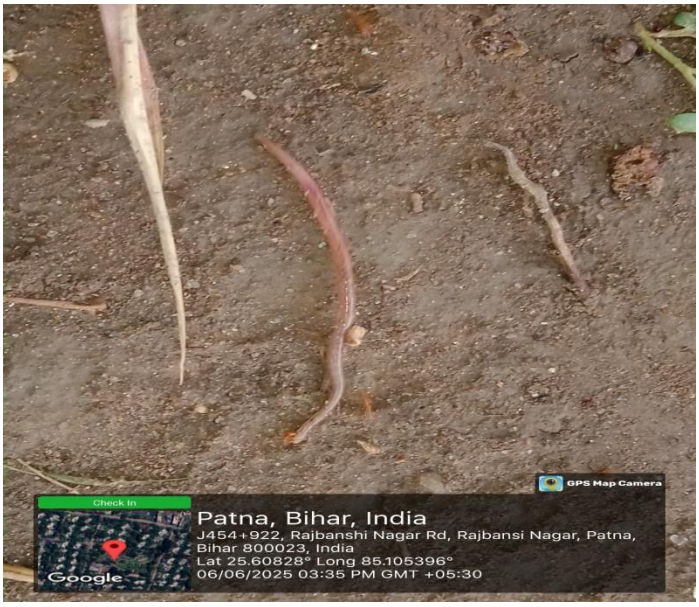
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Orthoptera
- **Family:** Gryllidae
- **Genus:** Gryllus
- **Species:** *Gryllus bimaculatus*

Appearance:

- Color: Dark brown to black
- Body**:** Oval and robust
- Antennae: Long and thin (often longer than the body)
- Wings**:** Flattened over the back
- Legs: Strong hind legs for jumping

Environmental Role:

- Decomposer: Helps recycle dead organic matter
- Food source: For birds, reptiles, spiders, frogs
- Can damage seedlings if population is high



Metaphire posthuma

Classification

- **Kingdom:** Animalia
- **Phylum:** Annelida
- **Class:** Clitellata
- **Order:** Haplotaxida
- **Family:** Megascolecidae
- **Genus:** Metaphire
- **Species:** *Metaphire posthuma*

Appearance:

- Body**:** Segmented, elongated, soft
- Color**:** Reddish-brown or pink
- Size**:** 5 to 15 cm, but varies by species
- Movement**:** Moves by contracting circular and longitudinal muscles in its segments

Environmental Role:

- Soil fertility enhancer: Through burrowing and castings
- Natural decomposer
- Used in vermicomposting
- Indicator of healthy soil



Lygus lineolaris

Classification:

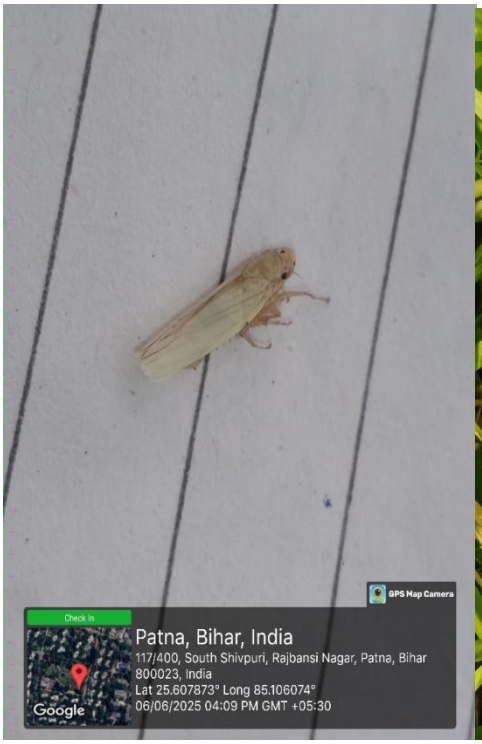
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Miridae
- **Genus:** Lygus
- **Species:** *Lygus lineolaris*

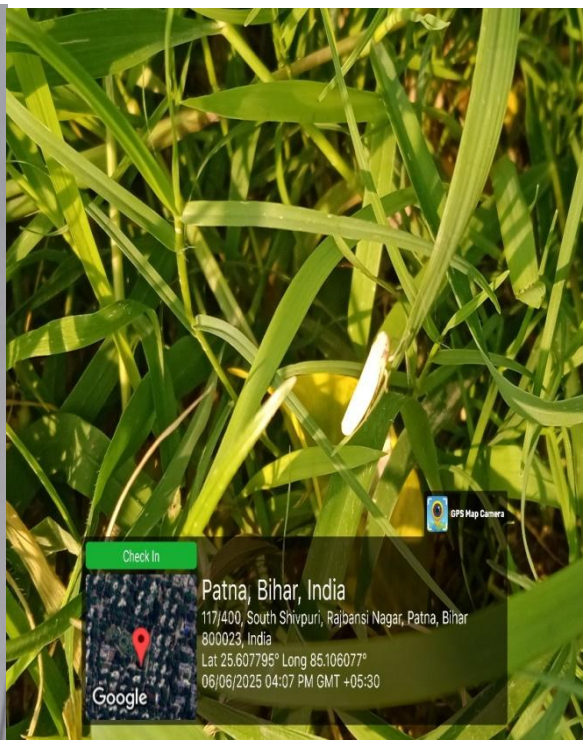
Appearance:

- Small bug, about 5–6 mm long
- Brown to reddish-brown in color
- Yellowish or pale markings on the wings and thorax
- Triangular marking (yellow or light-colored) on the back (scutellum)

Environmental Impact:

- Considered a major agricultural pest
- Causes economic losses by:
    - Distorting growth
    - Reducing fruit/seed set
    - Transmitting plant pathogens





Empoasca fabae

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Cicadellidae
- **Genus:** Empoasca
- **Species:** *Empoasca fabae*

About:

Leafhopper (a small, sap-sucking insect from the Cicadellidae family*)*

This insect is commonly seen on plants, crops, and leaves, and can jump quickly when disturbed.

Appearance:

- Size: 3–6 mm
- Color: Pale yellow, cream, or greenish (varies by species)
- Body Shape**:** Wedge-shaped body
- Wings**:** Transparent or lightly colored, lie flat over the body
- Eyes**:** Prominent compound eyes
- Legs**:** Strong hind legs for jumping

Environmental Impact:

- Agricultural pests – major threat to crops like rice, cotton, beans, etc.
- Transmit viral diseases in plants
- Cause economic damage in large infestations

- Natural prey for spiders, birds, ladybugs, and parasitoid wasps
- Indicator of changes in crop health or ecological balance



Aspidimorpha miliaris

Classification

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Coleoptera
- **Family**: Chrysomelidae
- **Genus**: *Aspidimorpha*
- **Species**: *Aspidimorpha miliaris*

Appearance

Shape: Dome-like, rounded like a tortoise shell.

- Color: Typically dark brown to black or metallic; may have a shiny or reflective surface.
- Size: Small, around 5–10 mm in length..

Environmental Effects

Part of the natural food chain (preyed on by birds, spiders, and other insects).Useful in ecological balance of plant-feeding insect populations.

The four different habitat inside navin sinha smriti park

AREA 1:Grassland

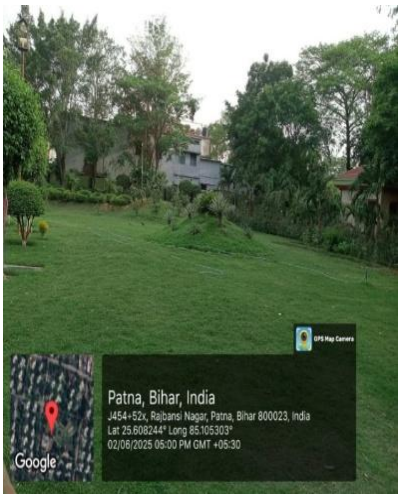
This is a managed urban grassland habitat located in Rajbansi Nagar, Patna, Bihar. It features a well-maintained grassy lawn surrounded by ornamental trees, shrubs, and small landscaped plants. The habitat supports a variety of insects, such as beetles and butterflies, and attracts

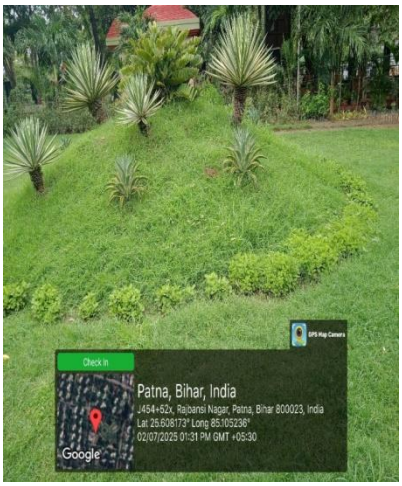
CLIMATE :Direct expire of sun rays

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(Start)
(End)
Image © 2025 Airbus


Patna, Bihar, India
J454+922, Rajbansi Nagar Rd, Rajbansi Nagar, Patna, Bihar 800023, India
Lat 25.608208° Long 85.10512°
25/04/2025 10:40 AM GMT +05:30
Google

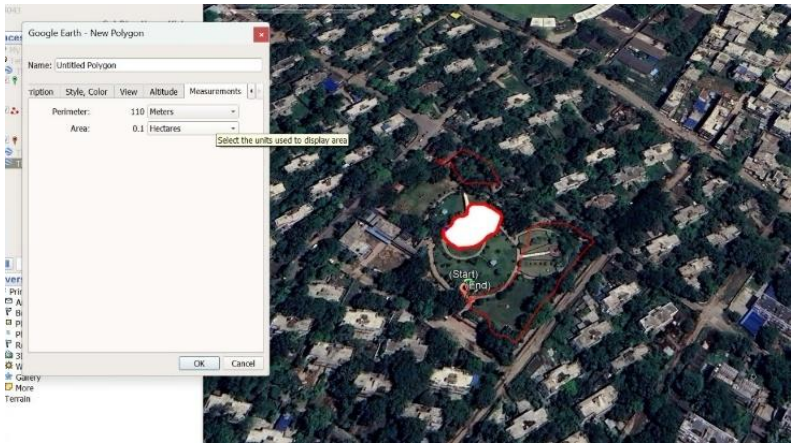

Patna, Bihar, India
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Google

AREA 2:Dry Sandy land

The dominant vegetation includes dense bamboo clusters, which form thick canopies and serve as natural shelters for birds and small insects. These bamboo groves also help in preventing soil erosion and contribute to maintaining a cooler microclimate. Alongside bamboo, there are several medium-height deciduous **trees** with trunks painted for protection and identification. The ground cover is partially bare, with scattered patches of grass ,herbs, indicating moderate footfall and park management.

Microclimate:Least sun ray ,moist .





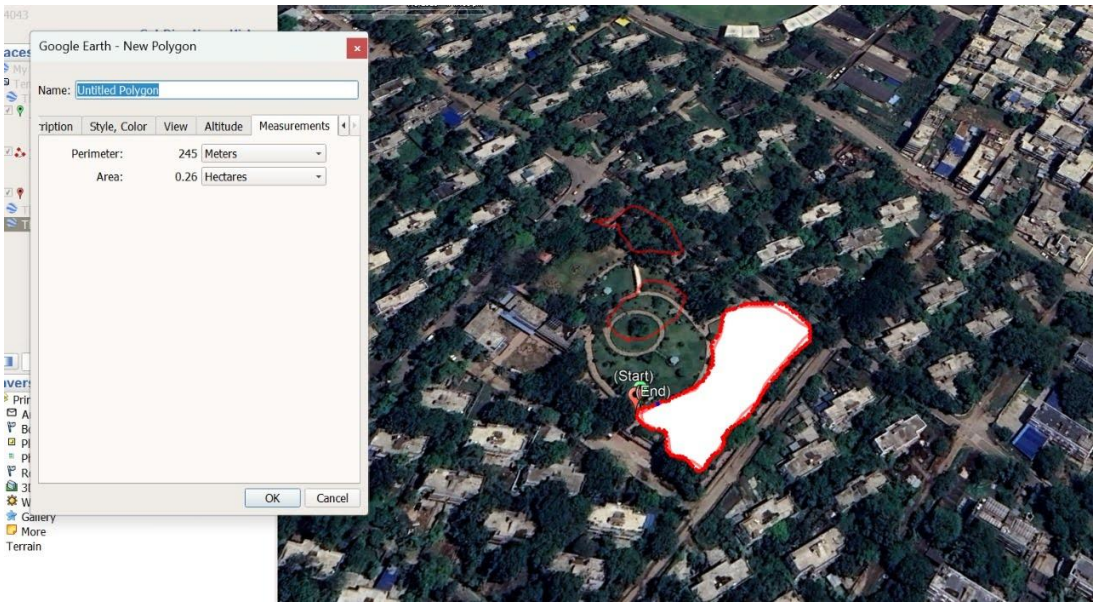




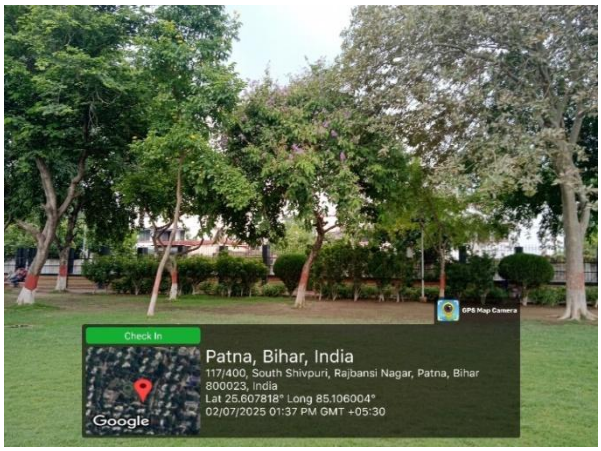
AREA 3:TREE AREA

This area represents an well-maintained ornamental vegetation. The landscape features a dense mix of decorative and native species, including Pride of India (Lagerstroemia speciosa) with purple blooms**,** Yellow Bells (Tecoma stans)**,** and likely Ashoka trees (Polyalthia longifolia)**,** along with neatly trimmed shrubs and a carpet of Doob grass (Cynodon dactylon)**.** Serving as a green lung in the city, this urban ornamental greenscape supports ecological balance by enhancing air quality, offering microhabitats, and providing a serene environment for urban dwellers.

Climate:Moderate sunlight,Cooler surrounding, dry and moist soil.







AREA 1 INSECT COUNT TABLE:

Insect Name	Count
Papilio demoleus.	5
Sarcophaga carnaria	3
Beam-faced	4
Coccinellidae	7
Acrida cinerea	2
Dysdercus singulatus	6
Platytes tritisticta	8
Azure Damselfly	3
Psocidina	43
Polistes flavus	10

AREA 2 INSECT COUNT TABLE:

Insect Name	Count
Polistes flavus	8
Oxya hyla	5
Musca domestica	14
Earthworm	2
Jumping spider	1
Shield bug	5
Leafhopper	1
Swadhant?	1
Field cricket	35
Whitefly	7
Pseudozizeeria maha	1
Ropalidia marginata	2
Thomisus spectabilis	1
Rove beetle	24

AREA3 INSECT COUNT TABLE:

insect	Count
Linex lectularius	30
Polistes olivaceus	23
Eurema brigitta	1
Sarcophagidae carnaria	6
Catochrysops strabo	1
Aleyrodidae	1
Rose leafhopper	5
Menemerus bivittatus	2

VEER KUNWAR SINGH AZADI PARK



Veer Kunwar Singh Park, formerly known as Hardinge Park, is Patna's oldest and most iconic public park, established in 1916 during British rule. Spread across 22 acres on Veerchand Patel Road near R-Block, it was renamed in honor of freedom fighter Veer Kunwar Singh. The park features a bronze equestrian statue of Kunwar Singh, well-maintained lawns, walking paths, flower beds, a children's playground, a pond with ducks, and a mini traffic park built for road safety education. Open daily from early morning to evening, it offers a peaceful environment ideal for morning walks, yoga, and leisure activities with a nominal entry fee and free access in early hours.

Shaheed Veer Kunwar Singh Azadi Park is a harmonious blend of colonial heritage, revolutionary remembrance, community recreation, and modern functionality. Whether you seek a tranquil morning walk, a family outing in leafy lanes, a glimpse into Bihar's freedom struggle, or just a cozy spot amid the urban sprawl, this historic "Pari" offers all, making it a cherished green landmark of Patna.

HISTORY

Veer Kunwar Singh Azadi Park, formerly known as Hardinge Park, is one of the oldest and most historically significant public parks in Patna. It was established in January 1916 during British colonial rule and was originally named after Lord Hardinge, the then Viceroy of India. The park once held a life-size bronze statue of Lord Hardinge, symbolizing colonial power and prestige. In 1921, it gained further prominence when it hosted a grand garden party in honor of Edward VIII, the Prince of Wales.

After India gained independence, the park was renamed to honor Shaheed Veer Kunwar Singh**,** a heroic freedom fighter and key figure in the 1857 Revolt against the British. Veer Kunwar Singh, the Zamindar of Jagdishpur (in present-day Bihar)**,** is remembered for his valiant role in leading one of the most effective rebellions in the first war of Indian independence.

To further commemorate his legacy, in April 2018, a majestic equestrian statue of Veer Kunwar Singh was installed at the park's entrance, depicting him with a raised sword—a symbol of resistance and courage. The park also features murals, terracotta art, and light-and-sound shows that narrate his contribution to India's freedom struggle.

Thus, the park has transformed from a colonial-era symbol into a proud monument of patriotism and heritage, celebrating the spirit of India's freedom fighters while serving as a vibrant public space for modern Patna.



Dysdercus cingulatus,

Classification:

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Hemiptera
- **Family**: Pyrrhocoridae
- **Genus**: *Dysdercus*
- **Species**: *Dysdercus cingulatus*

About:

Dysdercus cingulatus is an economically important insect pest known for feeding on cotton bolls and seeds, staining cotton lint and reducing its commercial value. It is widely found in South and Southeast Asia.

Dysdercus cingulatus, commonly known as the Red Cotton Bug or Cotton Stainer, is a serious pest of cotton and other crops in tropical and subtropical regions, including India.

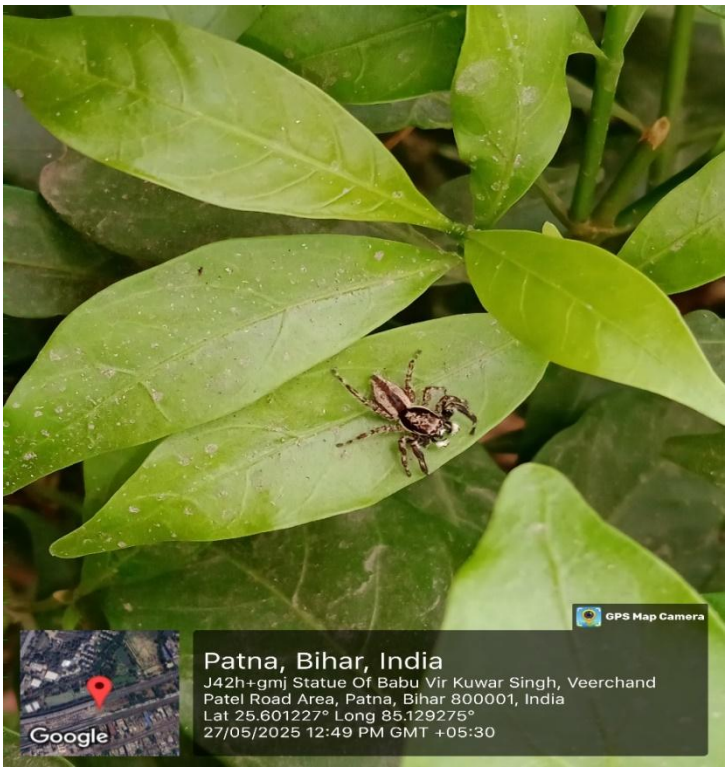
Appearance:

- Size: About 12–18 mm long.
- Color: Bright reddish or orange body, with black markings on the wings and thorax.

- The forewings are partially black, and the abdomen is exposed and vibrant red.
- Has piercing-sucking mouthparts, typical of true bugs.

Environmental Effect:

- Major pest of cotton – reduces quality and market value due to staining and rot.
- Also affects okra, hibiscus, and other crops.
- Secondary fungal infections due to puncture wounds worsen crop loss
- Acts as part of the food chain, being prey to spiders, birds, and parasitic wasps.
- Helps in maintaining ecological diversity, though its pest impact is significant



Menemerus bivittatus

Classification:

- Kingdom: Animalia
- Phylum: Arthropoda
- Class: Arachnida
- Order: Araneae
- Family: Salticidae
- Genus: *Menemerus*

- Species: *Menemerus bivittatus*

About:

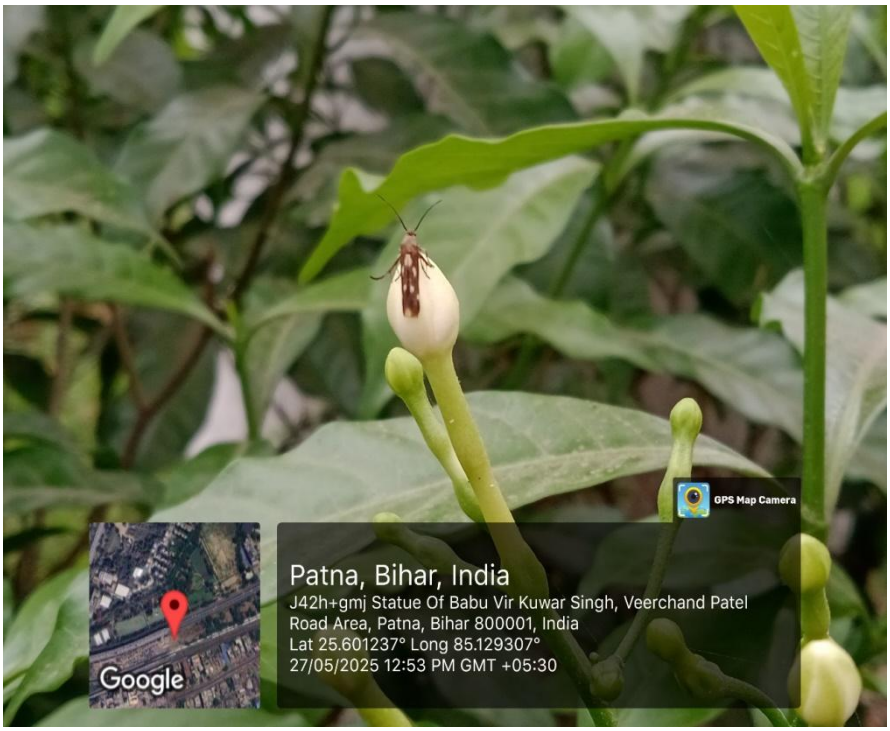
Jumping spiders are small, compact, and active hunters known for their excellent vision and jerky, agile movements. They have large front-facing eyes, giving them a "curious" appearance.
The spider in the image shows the characteristic bold markings, with a striped or patterned body (often brownish-black with white or tan markings)

Appearance:

- Size**:** 6–12 mm in body length.
- Color: Dark brown to black with white or cream stripes on the cephalothorax and abdomen.
- Eyes: 8 eyes in total**;** 2 large front eyes for sharp vision.
- Body**:** Compact body with a broad cephalothorax and rounded abdomen.
- Legs**:** Short, sturdy legs; front pair thicker for grabbing prey.
- Texture: Covered in short fine hairs, giving a velvet-like appearance.
- Movement**:** Capable of quick, precise jumps – often seen making sudden, agile movements.
- Face: "Flat-faced" appearance with a distinct black-and-white pattern near the eyes.

Environmental impact:

- Controls pest populations by feeding on flies, mosquitoes, moths, and ants.
- Supports biodiversity by serving as prey for birds, reptiles, and other predators.
- Adapts well to urban areas, maintaining insect control in human-dominated habitats.



Eretmocera impactella.

.**Classification**:

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Lepidoptera
- **Family**: Pyralidae
- **Genus**: *Etiella*
- **Species**: *Etiella zinckenella*

About:

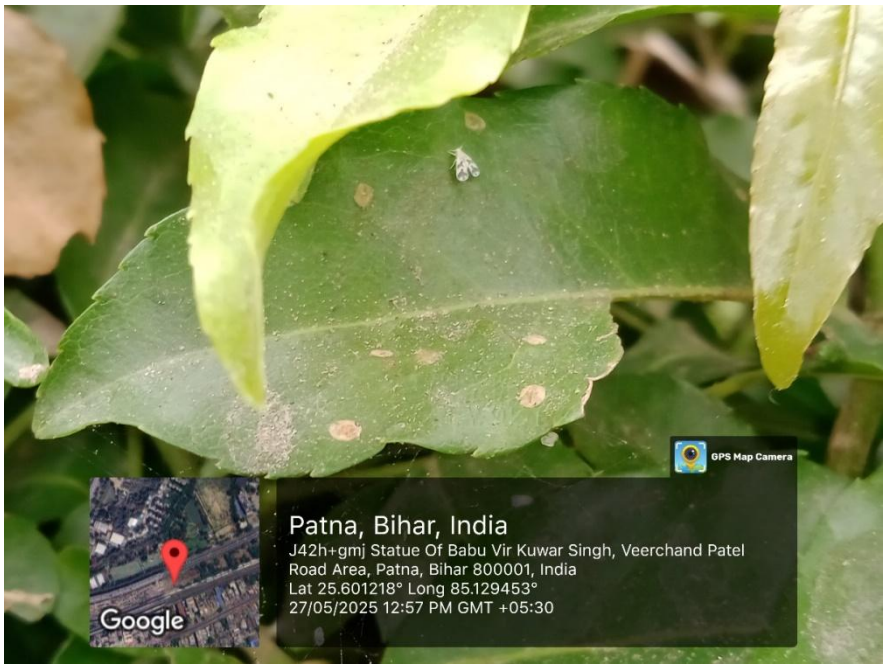
Etmocera impactella is a seed borer moth, particularly damaging in pulses. The larvae bore into pods, feeding on developing seeds, causing direct loss of yield. It is widespread across India, Asia, and Africa in pulse-growing regions.

Appearance:

- Size: Around 10–15 mm long when mature.
- Behavior: Bores into pods and eats seeds from inside, often undetected until damage is visible.

Environmental impact:

- Part of the natural food web (prey for birds, parasitoid wasps, spiders).
- Infestation levels help gauge ecological balance in unsprayed or organic fields



Diaphorina

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Liviidae
- **Genus:** *Diaphorina*
- **Species:** *Diaphorina citri*

About

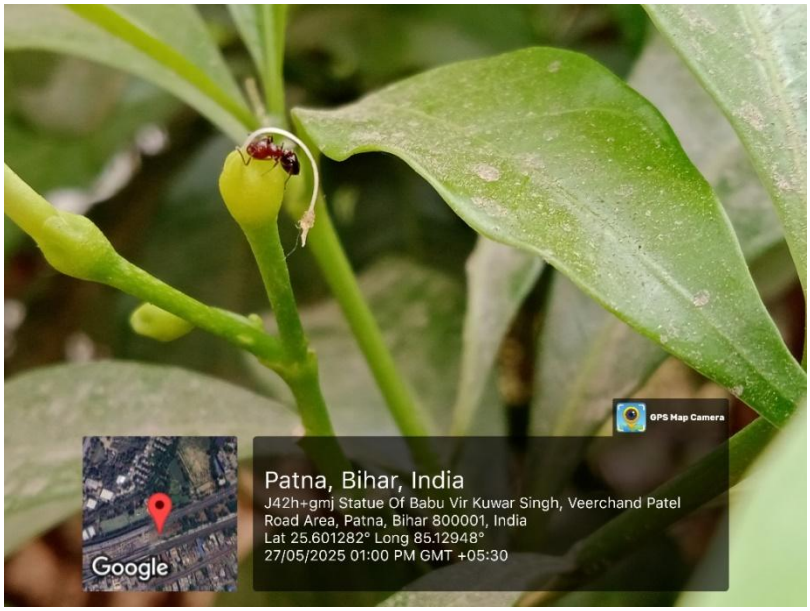
Whiteflies are tiny, sap-sucking insects that belong to the family Aleyrodidae. Despite their name, they are not true flies. The species Bemisia tabaci is one of the most notorious agricultural pests worldwide and is commonly found in India's tropical and subtropical regions, including urban parks

APPEARANCE

- Size**:** 1–2 mm
- Color: Pale white or yellowish body with powdery white wings
- Shape**:** Wings held tent-like over the body
- Visible Location: Underside of leaves, often in clusters
- Special Feature: Wings are dusted with waxy secretion, giving them a white appearance

Environmental Impact:

- Major agricultural pest – Transmits *Candidatus Liberibacter asiaticus*, the bacterium causing Huanglongbing
- Crop loss – Causes severe damage to citrus plants, reducing fruit quality and yield.
- Economic harm – Increases costs for pest control and citrus production.



Solenopsis

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hymenoptera
- **Family:** Formicidae
- **Subfamily:** Myrmicinae
- **Genus:** *Solenopsis*
- **Species:** *Solenopsis invicta*

About:

Solenopsis ants are small to medium-sized (2–6 mm), reddish-brown to dark brown in color, with darker abdomens. They have a distinctive two-segmented waist (petiole) and elbowed antennae ending in a 10-segmented club. Workers vary in size within the colony, and their stinger is visible at the tip of the abdomen.

Appearance:

- Size ranges from 2–6 mm depending on worker caste.
- Reddish-brown to dark brown body with a slightly darker abdomen.
- Two-segmented waist (petiole**)** between thorax and abdomen.
- Elbowed antennae with 10 segments and a 2-segmented club.
- Smooth, shiny exoskeleton with minimal hair.

Environmental Impact:

- Prey on insect pests, aiding in natural pest control.
- Improve soil aeration through burrowing activity.



ABOUT

Ladybird beetles are small, rounded beetles known for their bright coloration and spots. They are beneficial insects widely found in gardens, parks, and farms due to their role in controlling pest populations

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Coleoptera
- **Family:** Coccinellidae
- **Genus:** *Coccinella*
- **Species:** *Coccinella septempunctata*

APPEARANCE:

- Size**:** 7–10 mm long.
- Shape: Dome-shaped, oval, and convex body.
- Color**:** Bright red or orange elytra (wing covers) with spots seven distinct black – three on each side and one central spot near the junction of the wings.
- Head & Pronotum**:** Black with small white markings near the eyes.
- Legs & Antennae**:** Short and black.

Environmenta limpact:

- Reduces chemical pesticide use in agriculture.
- Controls aphid populations naturally.
- Promotes healthy crop growth and yield.
- Maintains ecological balance in food chains.

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Polistes olivaceus.

Classification:

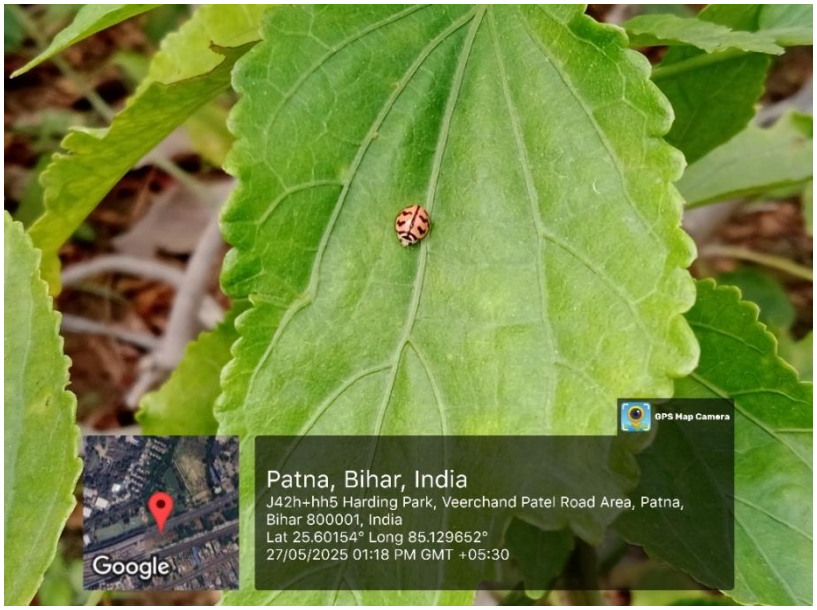
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hymenoptera
- **Family:** Vespidae
- **Genus:** *Polistes*
- **Species:** *Polistes olivaceus*

Appearance:

- Bright orange/yellow body with black bands
- Soft, elongated body
- About 1–2.5 cm in size
- Moves slowly, mostly seen on flowers or grass.

Environmental Impact

1. Larvae kill grasshopper eggs, acting as biocontrol agents
2. Contribute to natural pest regulation



Micrapis

Classification:

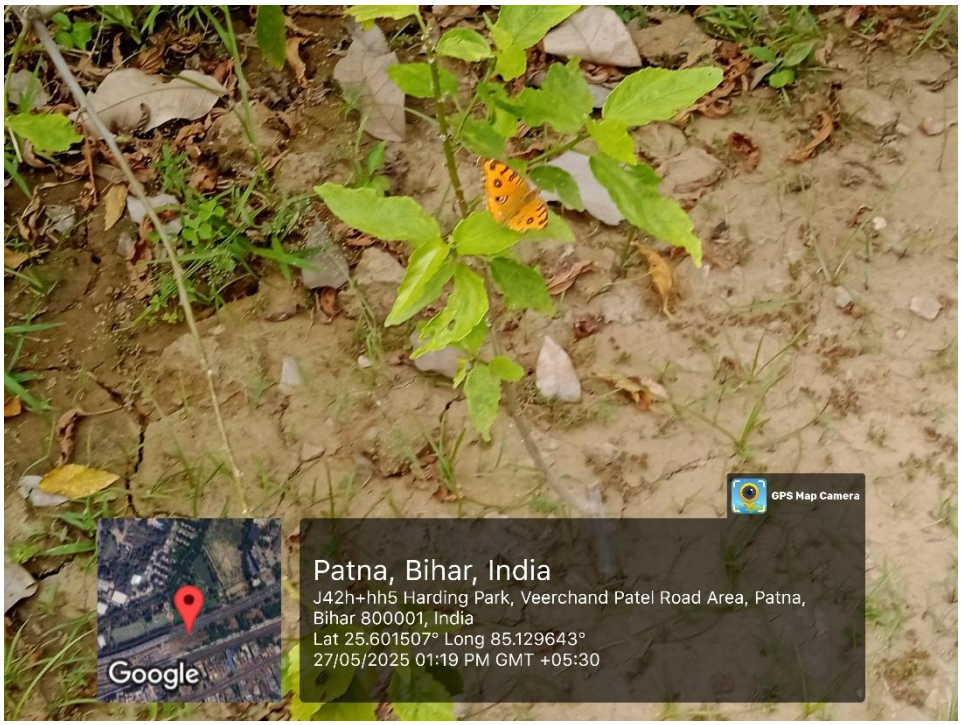
- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Coleoptera
- **Family**: Coccinellidae
- **Genus**: *Micraspis*
- **Species**: *discolor*.

Appearance

- Color**:** Yellowish to orange body with black longitudinal stripes.
- Shape**:** Oval, dome-shaped.
- Size: 4–6 mm long.
- Wings: Hard forewings with stripes.
- Antennae: Short and slightly curved.
- Legs: 6, blackish.

Environmental Impact

1. Beneficial in biological control—reduces pest populations.
2. Promotes eco-friendly agriculture by minimizing pesticide use.
3. Pollination support (adults occasionally feed on pollen).



Junonia almana

Classification:

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Lepidoptera
- **Family**: Nymphalidae
- **Genus**: *Junonia*
- **Species**: *J. almana*

Appearance

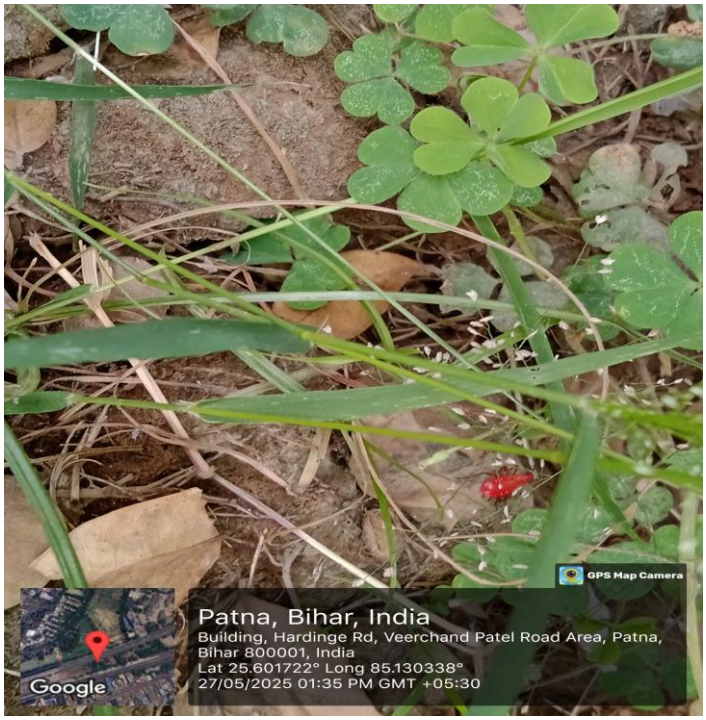
- Bright orange wings
- Prominent eye spots on hindwings
- Black borders with small white patches
- Wingspan: ~55–65 mm
- Seen basking in sunny open areas

Environmental Impact

- Pollination – Helps in pollinating wild & garden plants
- Biodiversity Indicator – Presence shows healthy habitat

Food web role-Larvee feed birds adult feed predators.

61



Clssification:

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Hemiptera
- **Family**: Miridae

Appearance

- Small, slender body (~4–7 mm)
- Pale brown/tan color with darker markings
- Long antennae and piercing-sucking mouthparts
- Often found on flower heads, buds, or leaves

Environmental Impact

- Pollination Help – Some species feed on nectar/pollen, aiding pollination
- Pest Control – Predatory mirid bugs feed on aphids, mites, and small pests
- Food Web Role – Serve as food for birds, spiders, and predatory insects
- Biodiversity Indicator – Presence shows healthy vegetation and insect diversity



Catopsilia pomona

Classification:

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Lepidoptera
- **Family**: Pieridae
- **Genus**: *Catopsilia*
- **Species**: *C. pomona*

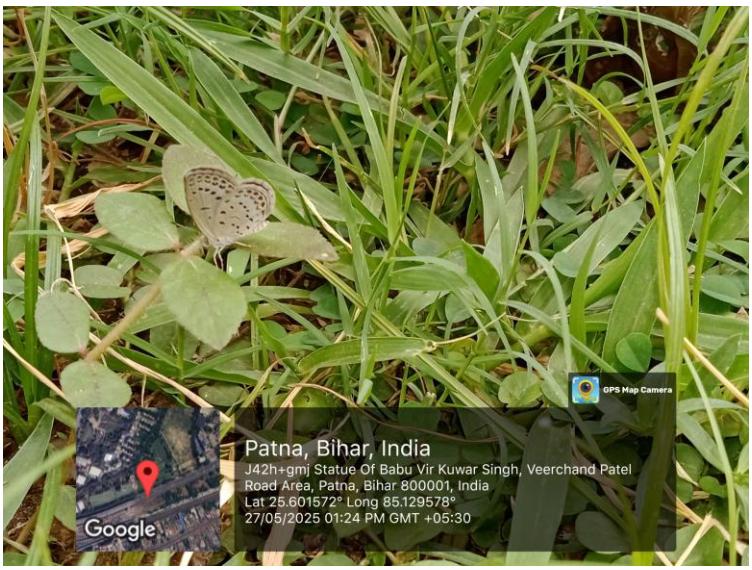
Appearance

- Pale greenish or yellowish wings
- Slender body, slightly pointed wingtips
- Faint veins visible on wings
- Wingspan ~60–70 mm
- Often seen near flowers and moist areas

Environmental Impact

- Pollination – Pollinates many wild and garden flowers
- Biodiversity Indicator – Signals a healthy ecosystem
- Supports Food Web – Larvae feed birds, wasps; adults feed predators

- Seasonal Migrator – Aids gene flow across regions



Zizula hylax

Classification:

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Lepidoptera
- **Family**: Lycaenidae *(Blues)*
- **Genus**: Zizula
- **Species**: *Zizula hylax*

Appearance

- Very small butterfly (~1.5 cm wingspan)
- Greyish with black spots on underwings
- Male upper side is pale bluish
- Found resting on grass and low plants

Environmental Impact

- Pollinator – Visits tiny flowers and herbs
- Biodiversity Marker – Found in balanced green spaces

- Food Web Link – Serves as prey for birds and spiders



Ropalidia marginata

Classification:

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Hymenoptera
- **Family**: Vespidae
- **Genus**: Ropalidia
- **Species**: *R. marginata*

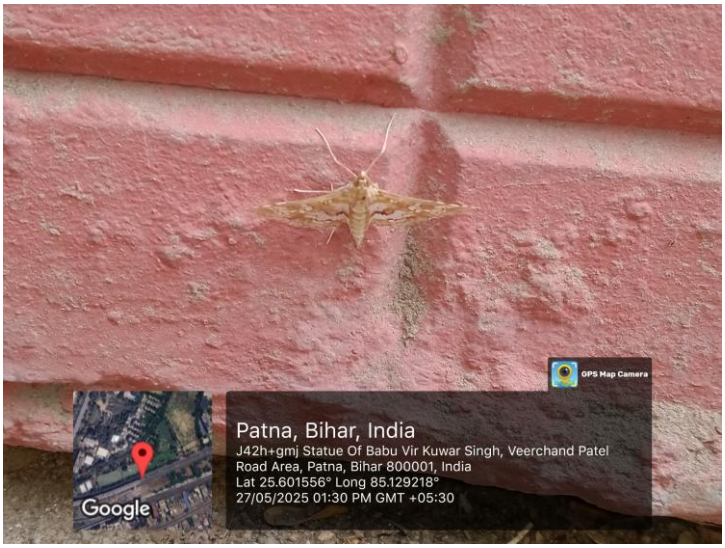
Appearance

- Medium-sized reddish-brown wasp
- Distinct narrow “waist”
- Yellowish markings on abdomen
- Wings held flat over body when at

Environmental Impact

- Natural Pest Controller – Feeds on caterpillars, aphids, and harmful insects
- Pollinator – Visits flowers for nectar
- Eco-Balancer – Maintains insect population control

- Biological Indicator – Presence shows healthy green areas



Glyphodes

Classification:

- Kingdom: Animalia
- Phylum: Arthropoda
- Class: Insecta
- Order: Lepidoptera
- Family: Crambidae
- Genus: Glyphodes

Appearance:

- Small to medium-sized moth
- Elongated "snout-like" mouthparts
- Pale brown wings with wavy white or cream patterns
- Wings spread flat when resting

Environmental Impact:

- Pollination – Active at dusk and night, helps pollinate night-blooming plants
- Part of Food Chain – Food for birds, spiders, frogs

- Decomposer Role – Larvae feed on dead organic matter in some species
- Biodiversity Indicator – Indicates a balanced micro-ecosystem



Dysdercus koenigii

Classification:

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Hemiptera
- **Family**: Pyrrhocoridae
- **Genus**: *Dysdercus*
- **Species:** *koenigii*

Appearance

- Small, oval body with black and red/orange patterns
- Long legs and antennae
- Distinct black "cross" or diamond pattern on back
- Usually found on leaves or near seed pods

Environmental Impact

- Pollination Help – Occasionally visits flowers while feeding

- Nutrient Cycling – Feeds on fallen seeds, aiding decomposition
- Ecological Balance – Preyed upon by birds and lizards, maintaining food chain



Empoasca fabae

Classification:

- **Kingdom**: Animalia
- **Phylum**: Arthropoda
- **Class**: Insecta
- **Order**: Hemiptera
- **Family**: Cicadellidae
- **Genus:** *Empoasca*
- **Species:** *Empoasca fabae*

Appearance

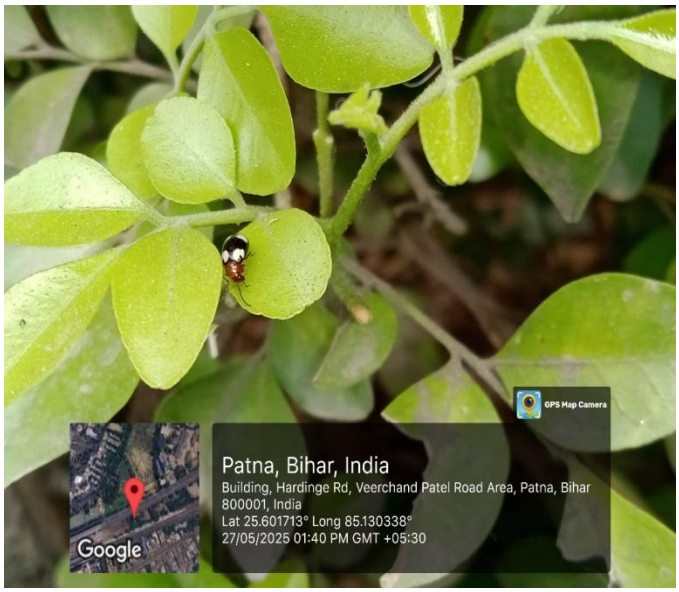
- Small, wedge-shaped body
- Light brown/tan color with markings
- Jumps quickly when disturbed
- Usually found on the underside of leaves or soft stems

Environmental Impact

- Pollination assistance – Some leafhopper species aid in minor pollination by transferring pollen

- Biodiversity maintenance – Act as prey for spiders, ants, lizards, and birds

- Indicator of plant health – Their presence can signal changes in plant condition or ecosystem balance



Monelepta signata

Classification:

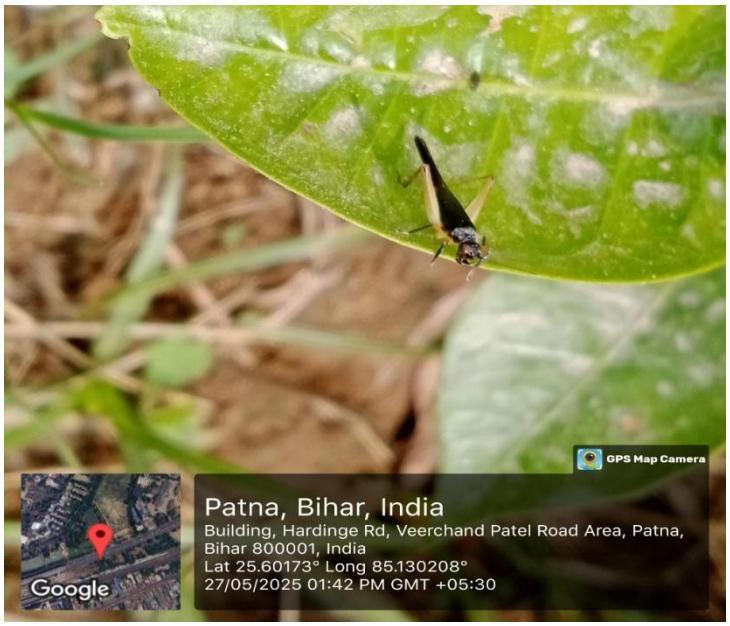
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Coleoptera
- **Family:** Chrysomelidae
- **Genus:** *Monelepta*
- **Species:** *Monelepta signata*

Appearance:

- Small-sized beetles (approx. 3–6 mm in length)
- Distinct bright reddish head and yellow or orange elytra (wing covers), sometimes with black spots or markings
- Slender body
- Long antennae
- Strong hind legs adapted for jumping (flea-like)

Environmental impct:

- Acts as **a** food source for natural predators like birds and spiders
- Indicator of crop health and biodiversity in an ecosystem (used in ecological monitoring in some cases



Gryllus emma

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Orthoptera
- **Family:** Gryllidae
- **Genus:** Gryllus
- **Species:** *Gryllus emma*

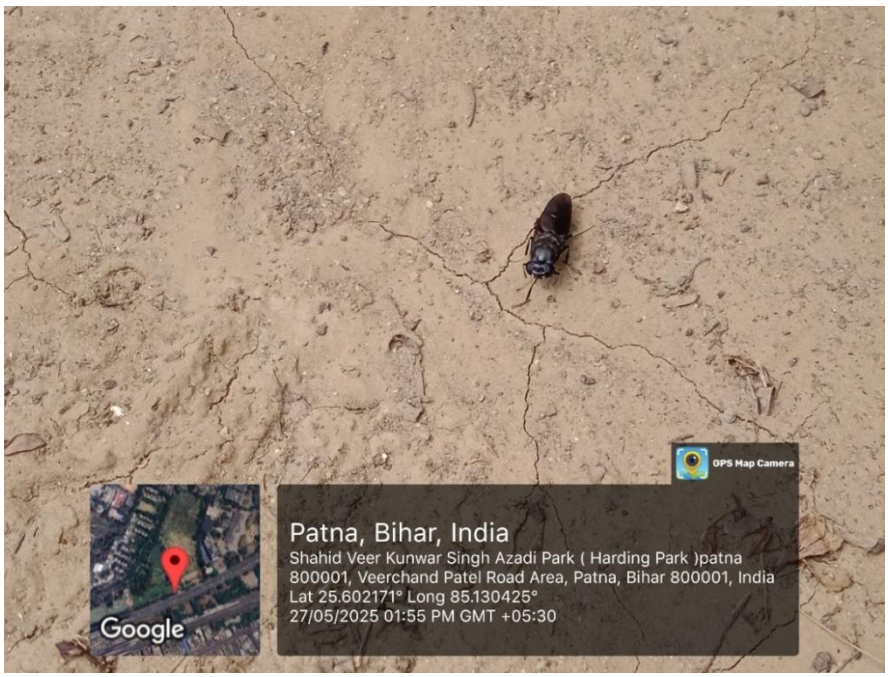
Appearance:

- Size: Around 2–3 cm long
- Color**:** Usually dark brown to black
- Body**:** Cylindrical body with strong hind legs for jumping
- Wings**:** Present in both sexes; males use them to produce chirping sounds
- Antennae**:** Long, thin antennae

- Distinguishing Feature**:** Loud and musical chirping (especially from males in the evening

Environmental Impact :

1. Soil Aeration & Decomposition**:** Helps break down plant material and organic matter, improving soil fertility.
2. Food Web Contribution**:**Serves as prey for birds, reptiles, spiders, and small mammals.
3. Pollination Aid**:**Occasionally helps in minor pollination while feeding on nectar.



Hermetia illucens

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Diptera
- **Family:** Stratiomyidae
- **Genus:** Hermetia
- **Species:** *H. illucens*

Appearance:

- Adult Size: About 15–20 mm long
- Color**:** Shiny black body with metallic blue/green highlights

- Wings**:** Dark, held flat over the body when at rest
- Antennae**:** Long, projecting forward
- Larvae: Fat, beige to brown maggots, legless and segmented

Environmental Impact

- Reduces organic waste (food scraps, manure)
- Larval frass serves as natural fertilizer
- Larvae used as protein-rich feed for animals (fish, poultry, pets)



Halictus ligatus

Classification:

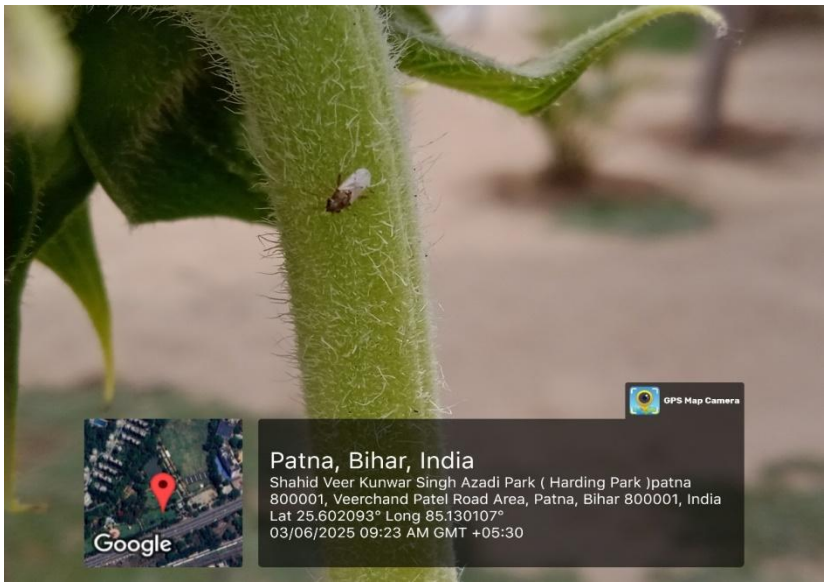
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hymenoptera
- **Family:** Halictidae
- **Genus:** Halictus
- **Species:** *H. ligatus*

Appearance:

- Medium-sized bee (about 7–10 mm)
- Black or dark brown body with pale bands on the abdomen
- Metallic sheen (sometimes greenish or bronze)
- Females slightly larger than males
- Hairy legs and body help collect pollen

Environmental Impact

- Important native pollinator of wildflowers and crops
- Active from early spring to late fall
- Enhances biodiversity by supporting plant reproduction
- Ground-nesting bee – helps aerate soil



Nysius raphanus

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Lygaeidae
- **Genus:** Nysius
- **Species:** *N. raphanus*

Appearance:

- Small insect (about 3–4 mm long)
- Grayish-brown body with slender shape
- Clear wings folded flat over the back
- Long legs and antennae
- Nymphs are smaller, wingless, and reddish to gray in color

Environmental Impact

- Feeds on mustard family plants, weeds, and crops
- Can cause crop damage (especially to seedlings during outbreaks)
- Usually minor pest, but migrates in large numbers during hot, dry weather
- Plays a role in plant-insect food chains
- No known beneficial impact on ecosystems
- Sudden outbreaks can stress native plants and gardens



Coccinella septempunctata

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Coleoptera
- **Family:** Coccinellidae
- **Genus:** Coccinella
- **Species:** *C. septempunctata*

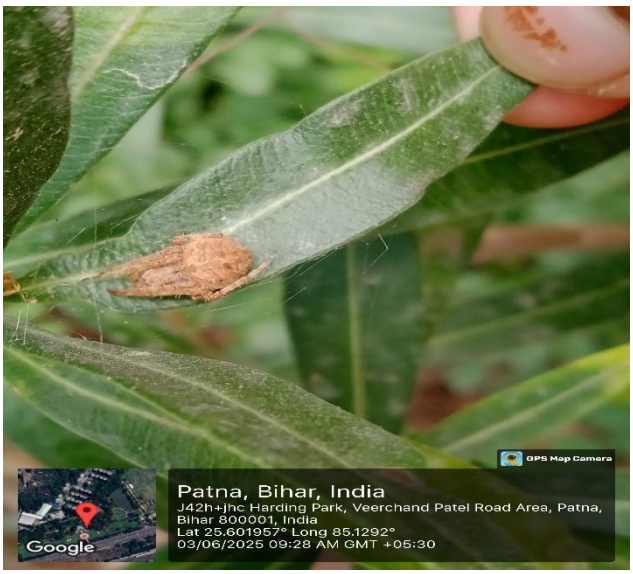
Appearance:

- Small, round or dome-shaped body (5–8 mm)
- Bright red, orange, or yellow with black spots (some species may be black or spotless)
- Short legs and antennae

Environmental Impact

- Natural predator of aphids, mites**,** and soft-bodied pests
- Reduces need for chemical pesticides in agriculture and gardens

- Protects crops like wheat, corn, vegetables, and fruit plants
- Supports biological control in ecosystems
- Helps maintain plant health and biodivers



Araneus diadematus

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Arachnida
- **Order:** Araneae
- **Family:** Araneidae
- **Genus:** *Araneus*
- **Species:** *Araneus diadematus*

Appearance:

- Medium to large size (varies by species, 6–20 mm body length)
- Round or oval abdomen; often colorful or patterned
- Long legs (often with banding)
- Builds spiral-shaped orb webs (commonly seen in gardens, forests)
- Females are larger than males

Environmental Impact

- Control pest insects like flies, moths, mosquitoes, beetles
- Natural biological control agents – reduce pesticide use
- Help maintain ecological balance in gardens, farms, and forests
- Non-aggressive to humans; bites are rare and harmless
- Web-building helps trap harmful insects before they damage crops/plants
- Support biodiversity as both predator and prey in food webs



Leptocoisa acuta

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Alydidae
- **Genus:** Leptocorisa
- **Species:** *L. acuta*

Appearance:

- Slender, elongated body (12–15 mm long)
- Greenish to brown color
- Long legs and antennae
- Prominent piercing-sucking mouthparts
- Emits a strong odor when disturbed (defensive mechanism

Environmental Impact :

- Contributes to food web in paddy field ecosystems
- Helps indicate ecosystem imbalances when in outbreak
- Can act as minor weed feeders in absence of crops, slightly aiding weed control



Oncopeltus fasciatus

Classification:

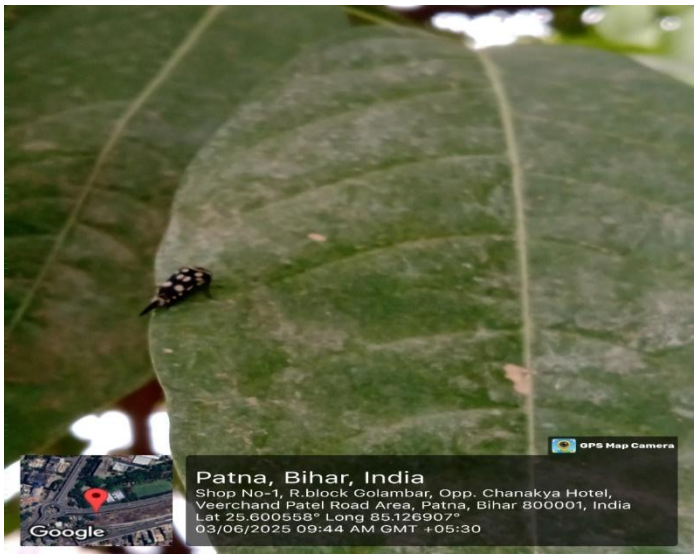
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Lygaeidae
- **Genus:** Oncopeltus
- **Species:** *O. fasciatus*

Appearance:

- Size**:** ~10–18 mm (adult)
- Color**:** Bright orange to red with black markings
- Body**:** Elongated, soft-bodied insect
- Antennae**:** Long, segmented
- Often found on leaves or stems of host plants like milkweed

Environmental Impact

- Feeds on milkweed seeds, helping control overgrowth
- Part of food web – prey for birds, spiders, and predatory insects
- Bright coloration may warn predators of toxicity (aposematism), aiding in natural balance



Cicindela

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Coleoptera
- **Family:** Carabidae
- **Subfamily:** Cicindelinae
- **Genus:** *Cicindela*

Appearance:

- Small to medium-sized beetle (~10–15 mm)
- Shiny black or dark-colored body with distinctive white or pale spots on the elytra (wing covers)
- Long legs and antennae
- Known for fast movement and active hunting
- Often found sunbathing or running on leaves, soil, or paths

Environmental Impact

- Active predator of pests like ants, caterpillars, and small insects
- Helps control agricultural and garden pests naturally
- Bioindicator species – presence signals healthy soil and ecosystem
- Both larvae and adults are predatory, contributing to food chain balance



Ropalidia marginata

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hymenoptera
- **Family:** Vespidae
- **Subfamily:** Polistinae
- **Genus:** *Ropalidia* / *Polistes*
- **Species:** *R. marginata*

Appearance:

- Size**:** Medium (1.5–2.0 cm)
- Color**:** Bright reddish-brown and yellow banded body
- Body**:** Slender waist, long legs hang during flight
- Wings**:** Fold longitudinally at rest
- Builds small paper-like nests using chewed plant fibers

Environmental Impact

- Predators of caterpillars, flies, and garden pests – natural pest control
- Help maintain ecological balance in gardens and farmlands
- Involved in pollination (minor role while foraging nectar)



Menemerus bivittatus

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Arachnida
- **Order:** Araneae
- **Family:** Salticidae (Jumping Spiders)
- **Genus:** *Plexippus* / *Menemerus*
- **Species:** *P. paykulli*

Appearance:

- Size**:** ~8–12 mm
- Color**:**Males: Dark brown or black with white stripes
- Females: Light brown with mottled patterns
- Body**:** Compact, hairy body with large front-facing eyes
- Movement**:** Quick, with strong jumping ability

Environmental Impact

- Feeds on flies, mosquitoes, and small pest insects
- Acts as a natural pest controller in homes and gardens
- Non-aggressive and harmless to humans
- Helps maintain ecological balance



Oxyopes javanus

Classification:

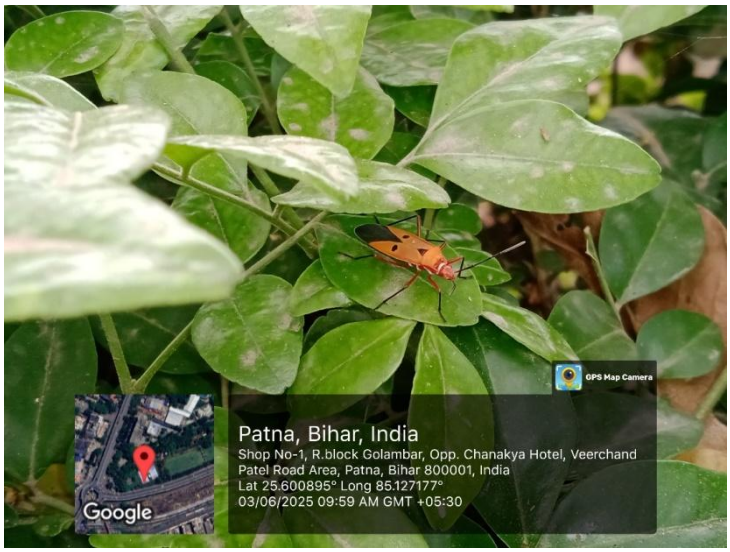
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Arachnida
- **Order:** Araneae
- **Family:** Oxyopidae
- **Genus:** *Oxyopes*
- **Species:** *Oxyopes javanus*

Appearance:

- Size**:** 8–10 mm
- Color**:** Pale yellow, green, or brown body
- Eyes: Eight eyes arranged in a hexagon-like pattern
- Body Features**:**Slender, elongated legs with spines
- Distinct chevron markings or stripes on the abdomen

Environmental Impact

- Predatory role**:** Feeds on leafhoppers, aphids, small insects, flies, and pests
- Acts as a natural pest control agent in gardens and agricultural fields
- Reduces dependence on chemical pesticides



Dysdercus cingulatus

Classification:

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Pyrrhocoridae
- **Genus:** *Dysdercus*
- **Species:** *D. cingulatus*

Appearance:

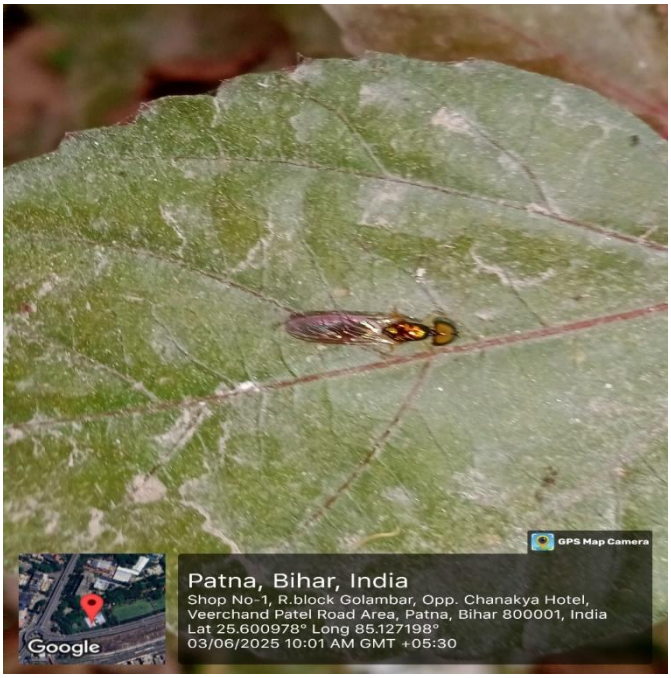
- Size**:** ~12–18 mm
- Color**:** Bright red or orange with black markings
- Wings**:** Semi-transparent black-tipped wings folded flat over the back
- Legs & Antennae**:** Long and black
- Distinctive Mark**:** Two round black dots on the thorax

Environmental Impact

- Sucks sap from cotton bolls, staining the cotton with its excreta

- Causes boll shedding and reduced cotton quality

Also feeds on okra, hibiscus, and other Malvaceae family plants



Brachymeria podagrica

Classification

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hymenoptera
- **Family:** Chalcididae
- **Genus:** *Brachymeria*
- **Species:** *podagrica*

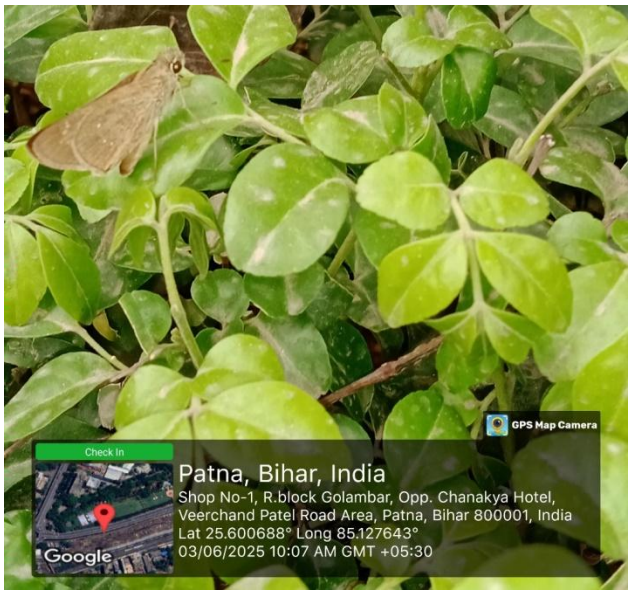
Appearance

- Very small size (around 3–6 mm)
- Metallic body with greenish, bluish, or golden sheen
- Enlarged hind femora with small spines or teeth (typical of *Brachymeria*, family Chalcididae)
- Transparent wings folded back over the body
- Short, elbowed antennae

Environmental Impact

- Parasitoid of pest caterpillars or insect larvae (e.g. Lepidoptera pupae)

- Natural biological control agent, helping reduce pest insect populations
- Promotes ecosystem balance, especially in agricultural and garden settings



Taractrocera maevius

Classification

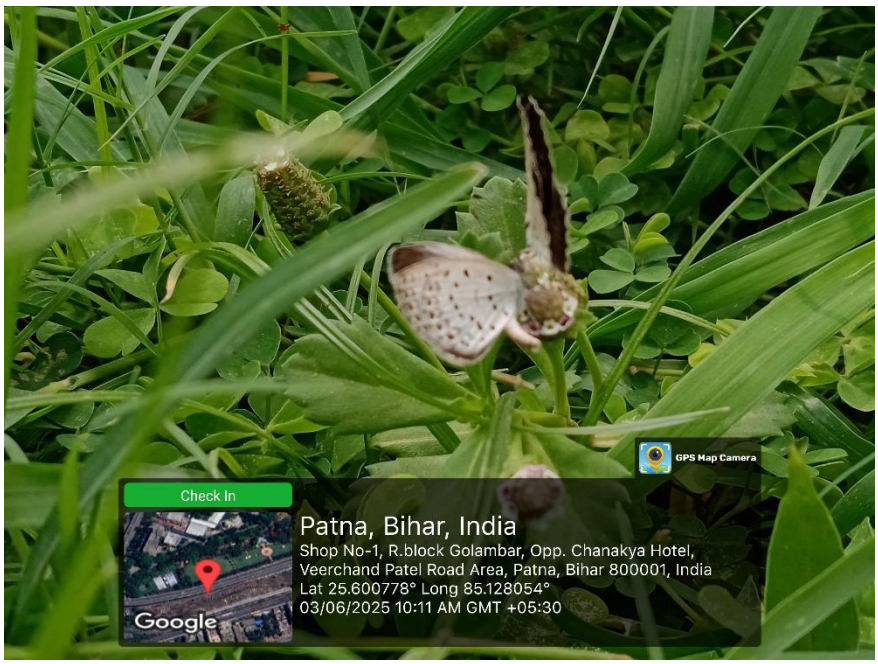
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Lepidoptera
- **Family:** Hesperiidae
- **Genus:** *Taractrocera*
- **Species:** *maevius*

Appearance

- Small butterfly, 20–30 mm wingspan
- Brownish or dark fawn-colored wings
- Forewings have yellowish or pale spots
- Characteristic resting posture with forewings held at an angle while hindwings lay fla

Environmental Impact:

- Pollination**:** Helps pollinate flowers while feeding on nectar
- Indicator species**:** Sensitive to habitat changes, so their presence often indicates healthy ecosystems
- Part of food chain**:** Larvae and adults serve as food for birds, reptiles, and other predators



Zizina otis

Classification

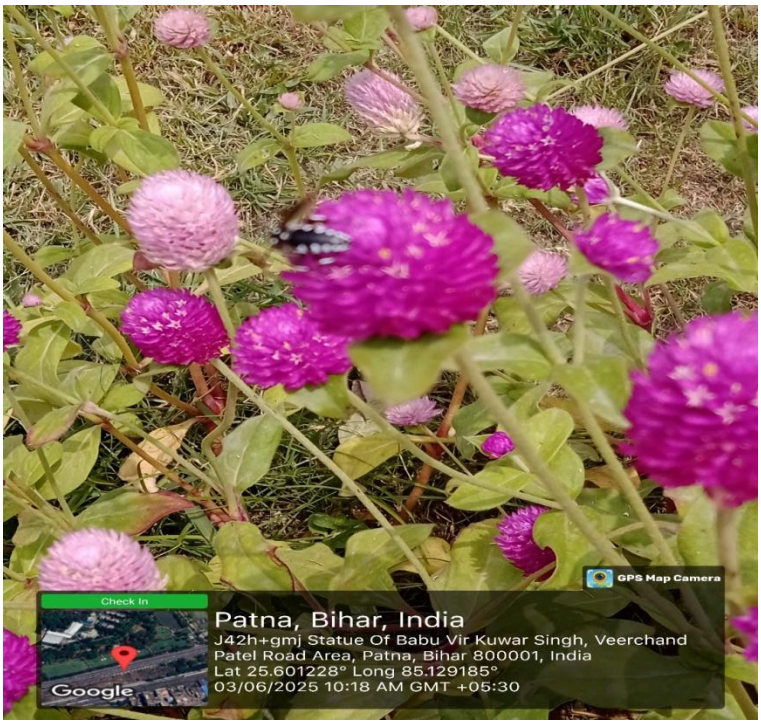
- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Lepidoptera
- **Family:** Lycaenidae
- **Genus:** Zizina
- **Species:** *Zizina otis*

Appearance

- Small-sized butterfly with a wingspan of about 20–30 mm.
- Upperside: Male is bluish with narrow brown borders; female is brownish with bluish scales near the base.
- Underside: Pale greyish or brownish with small black spots and faint white markings.
- Body slender, with fine black antennae tipped with white.

Environmental Impact

- Pollination: Helps pollinate small wildflowers and grasses, maintaining ecosystem balance.
- Food Chain Support**:** Acts as prey for birds, reptiles, spiders, and other predators, supporting biodiversity.
- Indicator Species**:** Presence indicates healthy grassy and meadow habitats.



Oxythyrea funesta

Classification

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Coleoptera
- **Family:** Scarabaeidae
- **Subfamily:** Cetoniinae
- **Genus:** Oxythyrea
- **Species:** *Oxythyrea funesta*

Appearance

- Medium-sized beetle (8–12 mm long).
- Body black, covered with distinctive white spots on the elytra (wing covers) and sometimes on the thorax.
- Underside hairy.
- Robust, oval-shaped body with clubbed antennae.
- Often found on flowers, especially in sunny conditions.

Environmental Impact

- Pollination Assistance**:** Adults feed on pollen and nectar while visiting flowers, aiding pollination.
- Nutrient Recycling**:** Larvae live in soil, helping break down organic matter and improving soil health.

- Biodiversity Support**:** Serves as prey for insectivorous birds, reptiles, and predatory insects.



Phymata americana

Classification

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Reduviidae
- **Subfamily:** Phymatinae
- **Genus:** Phymata
- **Species:** *Phymata americana*

Appearance

- Small insect (6–12 mm) with a robust, triangular body shape.
- Colors vary — often yellow, green, or brown with mottled patterns for camouflage.
- Enlarged, spiny front legs adapted for grasping prey.
- Pronounced “shoulders” give a jagged outline, helping it blend into flowers.

Environmental Impact

- Pest Control**:** Predates on many pest insects like flies, leafhoppers, and small caterpillars, helping maintain crop and garden health.
- Ecosystem Balance**:** Keeps herbivore insect populations in check, preventing overgrazing of plants.



Eretmocera impactella

Classification

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Lepidoptera
- **Family:** Scythrididae
- **Genus:** Eretmocera
- **Species:** *Eretmocera impactella*

Appearance

- Small moth with a wingspan of around 10–15 mm.
- Forewings are dark brown to black with distinctive yellow or orange patches.
- Hindwings are usually greyish or brown with a fringe of hairs.
- Slender body adapted for quick, darting flight.

Environmental Impact

- Pollination**:** Adults may contribute to pollination of small flowers while feeding on nectar.
- Food Source**:** Larvae and adults serve as prey for birds, spiders, and predatory insects, supporting the food chain.

- Ecosystem Balance**:** Plays a role in natural herbivory cycles, helping maintain plant diversity.



Xanthocnemis zealandica

Classification

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Odonata
- **Family:** Coenagrionidae
- **Genus:** Xanthocnemis
- **Species:** *Xanthocnemis zealandica*

Appearance

- Small to medium-sized damselfly, body length about 30–35 mm.
- Males have bright red or orange abdomens with black markings; females are usually duller brown or olive.
- Transparent wings with a narrow dark pterostigma near the tip.
- Slender body with large compound eyes and long, delicate legs.

Positive Environmental Impact

- Natural Pest Control**:** Both adults and aquatic larvae feed on mosquitoes, midges, and other small insects, reducing pest populations.
- Bioindicator**:** Presence indicates good water quality in streams, ponds, and wetlands.

- Ecosystem Balance**:** Part of both aquatic and terrestrial food webs, serving as prey for birds, fish, frogs, and spiders



Rhynocoris fuscipes

Classification

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Reduviidae
- **Genus:** Rhynocoris
- **Species:** *Rhynocoris fuscipes*

Appearance

- Medium-sized predatory bug with a bright orange to reddish body.
- Distinct black markings on the thorax and abdomen.
- Long, narrow head with a strong, curved rostrum (beak) for piercing prey.
- Long legs adapted for quick movement, often with contrasting black bands.

Positive Environmental Impact

- Natural Pest Control**:** Feeds on various agricultural pests like caterpillars, beetles, and other soft-bodied insects.
- **Ecosyste**m Balance**:** Helps maintain healthy insect population dynamics by controlling pest outbreaks.
- Biodiversity Support**:** Serves as prey for birds, lizards, and other larger predators.

LOCATION1:Grassland area









Location 1INSECT TABLE :

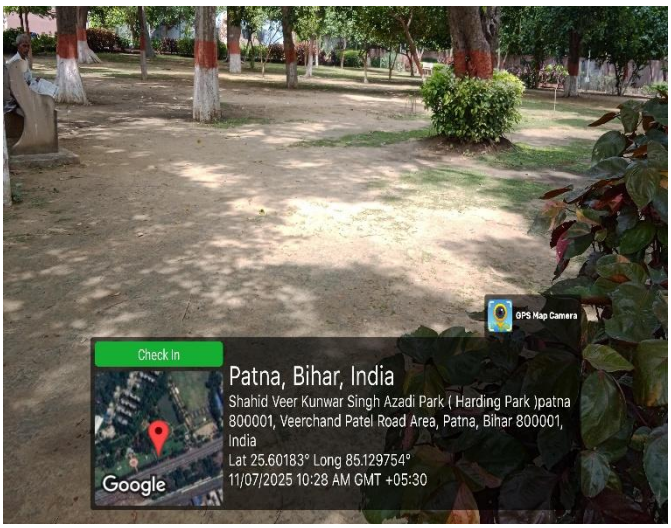
1	Coccinellidae (Ladybird beetle)	17
2	Sarcophaga carnaria	8
3	Rose leafhopper	2
4	Menemerus bivittatus	3
5	Rove beetle	26
6	Camponotus compressus	8
7	cinex lectularius	4
8	Polistes olivaceus	8
9	Calliphoridae (Blowfly)	5
10	Aleyrodidae (Whitefly)	9
11	Catochrysops strabo	7
12	Thomisus spectabilis	2
13	Polistes flavus	12

Location2: Dry area









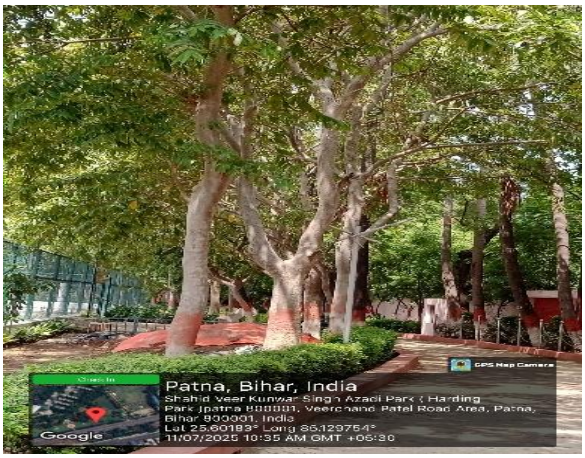
Location 2 insect table

S.No	Insect Name	count
1	Polistes flavus	9
2	Ropalidia marginata	6
3	Dysdercus singulatus	8
4	Shield bug	5
5	Leafhopper	9
6	Thomisus spectabilis	5
7	Swadhant	19
8	Jumping spider (green)	4
9	Azure Damselfly	3

Location 3: Tree area









Location 3 insect table

S.No	Insect Name	count
1	Coccinellidae (Ladybird beetle)	17
2	Sarcophaga carnaria	8
3	Rose leafhopper	2
4	Menemerus bivittatus	3
5	Rove beetle	26
6	Camponotus compressus	8
7	cinex lectularius	4
8	Polistes olivaceus	8
9	Calliphoridae (Blowfly)	5
10	Aleyrodidae (Whitefly)	9
11	Catochrysops strabo	7
12	Thomisus spectabilis	2
13	Polistes flavus	12

CALCULATIONS:

1. 1. Species richness (S) = number of taxa recorded.
2. Total individuals (N) = sum of counts.
3. Relative abundance: p_i = n_i / N
4. Shannon–Wiener diversity index (natural log): H' = -Σ p_i ln(p_i)
5. Pielou's evenness: J' = H' / ln(S)
6. Simpson's index (1 - λ): D = 1 - Σ p_i^2
7. Density = N / area (individuals per m²) and presented also per 1000 m².

Park 1:NAVIN SINHA SMRITI PARK

Location 1

Area = 1000 m²

Total individuals (N) = 91

Species richness (S) = 10

Proportions and component terms:

Species	Count (n_i)	$p_i = n_i/N$	$-p_i \ln(p_i)$	p_i^2
Acrida cinerea	2	0.021978	0.083906	0.000483
Azure Damselfly	3	0.032967	0.112492	0.001087
Beam-faced	4	0.043956	0.137344	0.001932
Butterfly	5	0.054945	0.159419	0.003019
Coccinellidae	7	0.076923	0.197304	0.005917
Dysdercus singulatus	6	0.065934	0.179281	0.004347
Platytes tritisticta	8	0.087912	0.213751	0.007729
Polistes flavus	10	0.109890	0.242668	0.012076
Psocidina	43	0.472527	0.354235	0.223282
Sarcophaga carnaria	3	0.032967	0.112492	0.001087

Shannon–Wiener Index (H')

Formula: $H' = -\sum p_i \ln(p_i)$

Substitution: H' = −[(0.021978×ln(0.021978)) + (0.032967×ln(0.032967)) + (0.043956×ln(0.043956)) + (0.054945×ln(0.054945)) + (0.076923×ln(0.076923)) + (0.065934×ln(0.065934)) + (0.087912×ln(0.087912)) + (0.109890×ln(0.109890)) + (0.472527×ln(0.472527)) + (0.032967×ln(0.032967))]

H' = 1.7929

Simpson's Index (D), Diversity (1−D), and Reciprocal (1/D)

Formulae: $D = \sum p_i^2$; 1−D = diversity; 1/D = reciprocal Simpson.

Substitution: $D = (0.021978)^2 + (0.032967)^2 + (0.043956)^2 + (0.054945)^2 + (0.076923)^2 + (0.065934)^2 + (0.087912)^2 + (0.109890)^2 + (0.472527)^2 + (0.032967)^2$

D = 0.2610, 1−D = 0.7390, 1/D = 3.8320

Pielou's Evenness (J)

Formula: $J = H' / \ln(S)$

Substitution: $J = 1.7929 / \ln(10) = 1.7929 / 2.3026$

J = 0.7786

Margalef Richness (d)

Formula: $d = (S - 1) / \ln(N)$

Substitution: $d = (10 - 1) / \ln(91) = (9) / 4.5109$

d = 1.9952

Menhinick Richness (Dmn)

Formula: $Dmn = S / \sqrt{N}$

Substitution: $Dmn = 10 / \sqrt{91} = 10 / 9.5394$

Dmn = 1.0483

Location 2

Area = 1000 m²

Total individuals (N) = 107

Species richness (S) = 14

Proportions and component terms:

Species	Count (n_i)	$p_i = n_i/N$	$-p_i \ln(p_i)$	p_i^2
Earthworm	2	0.018692	0.074387	0.000349
Field cricket	35	0.327103	0.365531	0.106996
Jumping spider (green colour)	1	0.009346	0.043671	0.000087
Leafhopper	1	0.009346	0.043671	0.000087
Musca domestica	14	0.130841	0.266101	0.017119
Oxya hyla	5	0.046729	0.143149	0.002184

Polistes flavus	8	0.074766	0.193898	0.005590
Pseudozizeeria maha	1	0.009346	0.043671	0.000087
Ropalidia marginata	2	0.018692	0.074387	0.000349
Rove beetle (Camponotus compressus)	24	0.224299	0.335277	0.050310
Shield bug	5	0.046729	0.143149	0.002184
Swadhant?	1	0.009346	0.043671	0.000087
Thomisus spectabilis	1	0.009346	0.043671	0.000087
Whitefly	7	0.065421	0.178397	0.004280

Shannon–Wiener Index (H')

Formula: $H' = -\sum p_i \ln(p_i)$

Substitution: $H' = -[(0.018692\times\ln(0.018692)) + (0.327103\times\ln(0.327103)) + (0.009346\times\ln(0.009346)) + (0.009346\times\ln(0.009346)) + (0.130841\times\ln(0.130841)) + (0.046729\times\ln(0.046729)) + (0.074766\times\ln(0.074766)) + (0.009346\times\ln(0.009346)) + (0.018692\times\ln(0.018692)) + (0.224299\times\ln(0.224299)) + (0.046729\times\ln(0.046729)) + (0.009346\times\ln(0.009346)) + (0.009346\times\ln(0.009346)) + (0.065421\times\ln(0.065421))]$

$H' = 1.9926$

Simpson's Index (D), Diversity (1−D), and Reciprocal (1/D)

Formulae: $D = \sum p_i^2$; 1−D = diversity; 1/D = reciprocal Simpson.

Substitution: $D = (0.018692)^2 + (0.327103)^2 + (0.009346)^2 + (0.009346)^2 + (0.130841)^2 + (0.046729)^2 + (0.074766)^2 + (0.009346)^2 + (0.018692)^2 + (0.224299)^2 + (0.046729)^2 + (0.009346)^2 + (0.009346)^2 + (0.065421)^2$

D = 0.1898, 1−D = 0.8102, 1/D = 5.2688

Pielou's Evenness (J)

Formula: $J = H' / \ln(S)$

Substitution: $J = 1.9926 / \ln(14) = 1.9926 / 2.6391$

J = 0.7551

Margalef Richness (d)

Formula: $d = (S - 1) / \ln(N)$

Substitution: $d = (14 - 1) / \ln(107) = (13) / 4.6728$

d = 2.7820

Menhinick Richness (Dmn)

Formula: $Dmn = S / \sqrt{N}$

Substitution: $Dmn = 14 / \sqrt{107} = 14 / 10.3441$

Dmn = 1.3534

Location 3

Area = 2600 m²

Total individuals (N) = 69

Species richness (S) = 8

Proportions and component terms:

Species	Count (n_i)	$p_i = n_i/N$	$-p_i \ln(p_i)$	p_i^2
Aleyrodidae	1	0.014493	0.061364	0.000210
Catochrysops strabo	1	0.014493	0.061364	0.000210
Eurema brigitta	1	0.014493	0.061364	0.000210
Linex lectularius	30	0.434783	0.362134	0.189036
Menemerus bivittatus	2	0.028986	0.102637	0.000840
Polistes olivaceus	23	0.333333	0.366204	0.111111
Rose leafhopper	5	0.072464	0.190193	0.005251
Sarcophagidae carnaria	6	0.086957	0.212378	0.007561

Shannon–Wiener Index (H')

Formula: $H' = -\sum p_i \ln(p_i)$

Substitution: $H' = -[(0.014493 \times \ln(0.014493)) + (0.014493 \times \ln(0.014493)) + (0.014493 \times \ln(0.014493)) + (0.434783 \times \ln(0.434783)) + (0.028986 \times \ln(0.028986)) + (0.333333 \times \ln(0.333333)) + (0.072464 \times \ln(0.072464)) + (0.086957 \times \ln(0.086957))]$

H' = 1.4176

Simpson's Index (D), Diversity (1−D), and Reciprocal (1/D)

Formulae: $D = \sum p_i^2$; 1−D = diversity; 1/D = reciprocal Simpson.

Substitution: $D = (0.014493)^2 + (0.014493)^2 + (0.014493)^2 + (0.434783)^2 + (0.028986)^2 + (0.333333)^2 + (0.072464)^2 + (0.086957)^2$

: D = 0.3144, 1−D = 0.6856, 1/D = 3.1804

Pielou's Evenness (J)

Formula: J = H′ / ln(S)

Substitution: J = 1.4176 / ln(8) = 1.4176 / 2.0794

J = 0.6817

Margalef Richness (d)

Formula: d = (S − 1) / ln(N)

Substitution: d = (8 − 1) / ln(69) = (7) / 4.2341

d = 1.6532

Menhinick Richness (Dmn)

Formula: Dmn = S / √N

Substitution: Dmn = 8 / √69 = 8 / 8.3066

Dmn = 0.9631

.

Park 2:VEER KUNWAR SINGH AZADI PARK

Areas

Location 1 area = 3585 m²

Location 2 area = 4056 m²

Location 3 area = 6551 m²

Calculations

Location 1

S = 13 taxa N = 111 individuals

Species	ni	pi	pi ln(pi)	pi^2
Coccinellidae (Ladybird beetle)	17	0.153153	-0.287364	0.023456
Sarcophaga carnaria	8	0.072072	-0.189556	0.005194
Rose leafhopper	2	0.018018	-0.072367	0.000325

Menemerus bivittatus	3	0.027027	-0.097592	0.000730
Rove beetle	26	0.234234	-0.339975	0.054866
Camponotus compressus	8	0.072072	-0.189556	0.005194
Cinex lectularius	4	0.036036	-0.119756	0.001299
Polistes olivaceus	8	0.072072	-0.189556	0.005194
Calliphoridae (Blowfly)	5	0.045045	-0.139644	0.002029
Aleyrodidae (Whitefly)	9	0.081081	-0.203700	0.006574
Catochrysops strabo	7	0.063063	-0.174282	0.003977
Thomisus spectabilis	2	0.018018	-0.072367	0.000325
Polistes flavus	12	0.108108	-0.240500	0.011687

Sum of (-pi ln pi) = 2.316217 (Shannon H')

Pielou's evenness J' = 0.903026

Simpson's index (1 - λ) D = 0.879149

Density = 0.030962 individuals/m² = 30.96 individuals/1000 m²

Location 2

S = 9 taxa N = 68 individuals

Species	ni	pi	pi ln(pi)	pi^2
Polistes flavus	9	0.132353	-0.267655	0.017517
Ropalidia marginata	6	0.088235	-0.214213	0.007785
Dysdercus singulatus	8	0.117647	-0.251772	0.013841

Shield bug	5	0.073529	-0.191917	0.005407
Leafhopper	9	0.132353	-0.267655	0.017517
Thomisus spectabilis	5	0.073529	-0.191917	0.005407
Swadhant	19	0.279412	-0.356269	0.078071
Jumping spider (green)	4	0.058824	-0.166660	0.003460
Azure Damselfly	3	0.044118	-0.137687	0.001946

Sum of (-pi ln pi) = 2.045745 (Shannon H')

Pielou's evenness J' = 0.931059

Simpson's index (1 - λ) D = 0.849048

Density = 0.016765 individuals/m² = 16.77 individuals/1000 m²

Location 3

S = 13 taxa N = 117 individuals

Species	ni	pi	pi ln(pi)	pi^2
Coccinellidae (Ladybird beetle)	20	0.170940	-0.301956	0.029221
Sarcophaga carnaria	8	0.068376	-0.183435	0.004675
Rose leafhopper	2	0.017094	-0.069556	0.000292
Menemerus bivittatus	3	0.025641	-0.093937	0.000657
Rove beetle	22	0.188034	-0.314230	0.035357
Camponotus compressus	8	0.068376	-0.183435	0.004675
Cinex lectularius	9	0.076923	-0.197304	0.005917
Polistes olivaceus	8	0.068376	-0.183435	0.004675

Calliphoridae (Blowfly)	5	0.042735	-0.134732	0.001826
Aleyrodidae (Whitefly)	9	0.076923	-0.197304	0.005917
Catochrysops strabo	9	0.076923	-0.197304	0.005917
Thomisus spectabilis	2	0.017094	-0.069556	0.000292
Polistes flavus	12	0.102564	-0.233566	0.010519

Sum of (-pi ln pi) = 2.359749 (Shannon H')

Pielou's evenness J' = 0.919998

Simpson's index (1 - λ) D = 0.890058

Density = 0.017860 individuals/m^2 = 17.86 individuals/1000 m^2

Results:

The insect diversity assessment was conducted across multiple locations in Navin Sinha Smriti Park and Veer Kunwar Singh Azadi Park.
The analysis used standard diversity indices, including Shannon–Wiener Index (H’), Simpson’s Diversity Index (1−D), Pielou’s Evenness (J), Margalef Richness (d), and Menhinick Richness (Dmn).

Navin Sinha Smriti Park:
- Location 1: H’ = 1.7929, 1−D = 0.7390, J = 0.7786, d = 1.9952, Dmn = 1.0483
- Location 2: H’ = 1.9926, 1−D = 0.8102, J = 0.7551, d = 2.7820, Dmn = 1.3534
- Location 3: H’ = 1.4176, 1−D = 0.6856, J = 0.6817, d = 1.6532, Dmn = 0.9631

Veer Kunwar Singh Azadi Park:
- Location 1: H’ = 2.3162, 1−D = 0.8791, J = 0.9030
- Location 2: H’ = 2.0457, 1−D = 0.8490, J = 0.9310
- Location 3: H’ = 2.3597, 1−D = 0.8900, J = 0.9200

Overall, the highest Shannon diversity was observed in Veer Kunwar Singh Park Location 3 (H’ = 2.3597), while the lowest was in Navin Sinha Smriti Park Location 3 (H’ = 1.4176). Simpson’s diversity was also highest in Veer Kunwar Singh Park Location 3 (1−D = 0.8900).

Conclusion:

The diversity indices indicate that Veer Kunwar Singh Azadi Park generally supports higher insect diversity and evenness compared to Navin Sinha Smriti Park.
This may be attributed to differences in habitat quality, vegetation cover, and microclimatic conditions.

Navin Sinha Smriti Park exhibited moderate diversity, with Location 2 performing better in species richness and Shannon diversity than the other two locations within the same park. However, Location 3 in this park showed the lowest diversity values, likely due to species dominance and reduced habitat heterogeneity.

In contrast, all locations in Veer Kunwar Singh Azadi Park showed relatively high diversity and evenness, suggesting a well-distributed insect community and balanced ecosystem. Location 3 in this park had the highest diversity overall, making it a potential hotspot for insect biodiversity conservation.

Unique Observations

Harding Park had unique families like Reduviidae , Libellulidae , Blattidae , etc.

Suggests greater habitat variety.

Ecological Significance

Presence of functional groups (pollinators, predators, decomposers) in both parks.

Reflects healthy, balanced ecosystems

CONCLUSION TABLE:

Aspect	Harding Park	Navin Sinha Park
Total Insect Species Identified	28	20
Insect Orders Covered	Lepidoptera, Coleoptera, Hemiptera, etc.	Diptera, Hymenoptera, Hemiptera, etc.
Common Insects	Ladybird Beetle, Grasshopper, Damselfly	Whitefly, Termite, Honey Bee
Vegetation Type	Dense trees and canopy cover	Mixed vegetation with open patches
Habitat Type	Shaded and Moist	Partly open and dry
Insect Diversity	High	Moderate
Unique Species	28-Spotted Ladybird, Rice Grasshopper	Stag Beetle, Bagrada Bug
Dominant Families	Coccinellidae, Acrididae	Aleyrodidae, Vespidae

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