ANNUAL PROJECT REPORT

(2023)

AMBER Foundation

(Amelioration of Biodiversity and Environmental Research)

Field Surveys and Training Program

AMBER Foundation

Reg. No: UK0600842023010898

(Registered Under Section 21 of Society Registration Act, 1860)

AMBER FOUNDATION

जैव विविधता संरक्षण में सुधार एवं पर्यावरण अनुसंधान

AMELIORATION OF BIODIVERSITY AND ENVIRONMENTAL RESEARCH

(Amelioration of Biodiversity and Environmental Research)
जैव वि वधता और पयावरण अनुसंधान म सुधार
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The AMBER Foundation is a public charitable trust working in the fields of biodiversity conservation, wildlife heritage, innovative research, and habitat conservation and management. We aim to conduct, strengthen, and communicate research on ecosystem services and sustainable development through community participation.

A non-profit organization dedicated to biodiversity conservation and the preservation of biotic heritage. The Foundation works diligently to protect and restore natural environments, ensuring the sustainability of our planet for future generations. Our efforts include reforestation, habitat restoration, wildlife preservation, training, and education on the importance of biodiversity and ecosystem services. We aim to create a harmonious balance between human development and the preservation of our natural world.

The AMBER Foundation, Dehradun

List of Team Members:

1. Dr. V. P. Uniyal (Chairperson)
2. Dr. Kailash Chandra
3. Dr. G. S. Rawat
4. Dr. Bitapi C. Sinha
5. Dr. Bhagwati Uniyal
6. Dr. Anil K. Bhardwaj
7. Krittika Uniyal
8. Dr. Mona Chauhan
9. Dr. Vandana Mehrwar
10. Dr. Irina Das Sarkar
11. Nidhi Rana

Our Mission

Our mission is to conserve and restore biodiversity through a global collaborative effort to safeguard the rich tapestry of life on Earth and ensure the well-being of present and future generations. We pledge to protect all species and ecosystems, promote sustainable practices, and inspire a deep and lasting connection between humanity and the natural world. Through science, education, and policy, we commit to preserving genetic, species, and ecosystem diversity, ultimately fostering a planet where biodiversity thrives, benefiting both nature and society.

Our Objectives

- Conservation of biodiversity through training and research.
- Restoration of degraded ecosystems and habitats.

- Organize execution, studies, and research work on current environmental and development issues, including protected landscape management, biodiversity conservation, and environmental planning /economics/law/policy.
- Formulate tangible measures, strategies, and plans for reducing the biotic pressure on forest areas and managing food resources.
- Organize environmental education and awareness programs through community participation.
- Build a cooperation and coordination network with the government(s), national and international organizations, institutions, grassroots community groups, and NGOs.

AMBER FOUNDATION is a charitable, not-for-profit research and development organization. It aims to contribute towards sustaining biodiversity and ecosystem services through better management, valuation, measurement, conservation, and restoration. It is working on environmental stability, biodiversity conservation and monitoring, capacity building of community-based organizations, ecological restoration, and participatory management of natural resources for the socio-economic benefit of local communities. Aligning with the principles of Sustainable Development Goals (SDGs), the foundation strives to value various ecosystem services from the natural environment and develop strategies for human welfare following participatory approaches.

Key activities of the foundation are:

- **Environmental Amelioration and Biodiversity Conservation:** The foundation members are trained in the inventory, evaluation, and monitoring of natural ecosystems and patterns of natural resource use by various socio-cultural groups in society. The Foundation prioritizes amelioration of the natural environment and biodiversity conservation, focusing on endangered species of flora and fauna.
- **Capacity Building of Community-Based Organizations:** One of our primary goals of the Foundation is to promote participatory approaches to conservation and capacity building of Community-Based Organizations (CBOs) such as Biodiversity Management Committees, members of Community Forestry Users' Groups, Eco-development Committees, and other Self-Help Groups in preparation of integrated conservation and development plans and micro-plans. The Foundation also helps in the preparation of People's Biodiversity Registers.
- **Restoration of Degraded Ecosystems:** The Foundation has the expertise and capacity to prepare eco-restoration plans for degraded ecosystems, including wildlife corridors, buffer zones of protected areas, alpine meadows, riverine ecosystems, etc. The foundation accords high priority to the preparation of landscape-level conservation plans and site-specific eco-restoration plans.

- **Contribute to Science:** Policy and Practices for the Valuation of Ecosystem Services and Promotion of the Green Economy. The importance of ecosystems in providing essential services to human well-being is accepted globally. The Foundation will work closely with line agencies and local communities to mainstream ecosystem service flow and valuation and develop strategies for equitable sharing of benefits from biodiversity and ecosystems.

Programmes

Biodiversity conservation refers to the protection, management, and sustainable use of the variety of life on Earth, including species, ecosystems, and genetic diversity. It is essential for maintaining the health and resilience of ecosystems and the well-being of both human and non-human life.

1. **Preservation of Species:** Protecting endangered and threatened species from extinction and restoring their populations.
2. **Habitat Conservation:** Preserving and restoring the natural habitats where species thrive, such as forests, wetlands, and coral reefs.
3. **Ecosystem Management:** Focusing on entire ecosystems, not just individual species, to maintain ecological balance.
4. **Genetic Diversity:** Preserving genetic variation within species, which is critical for adaptation to environmental changes.
5. **Sustainable Practices:** Encouraging sustainable use of natural resources, such as sustainable forestry and fisheries, to reduce negative impacts on biodiversity.
6. **Legislation and Policies:** Implementing laws and regulations to protect biodiversity, as well as international agreements like the Convention on Biological Diversity.
7. **Conservation of Indigenous Seeds:** Conservation of indigenous seeds is crucial for preserving biodiversity and food security. It involves saving and protecting traditional, locally adapted crop varieties from extinction. This practice helps maintain genetic diversity, adaptability to local conditions, and cultural heritage. Farmers, organizations, and governments play key roles in seed conservation through seed banks, community initiatives, and policy support.

Biodiversity conservation is not only important for ecological reasons but also for human well-being. It provides essential ecosystem services such as clean air and water, pollination of crops, and climate regulation. It is crucial for maintaining the balance of our planet.

The foundation has effectively applied its objectives and mission through two significant projects in the last year: the Countrywide Survey of Fireflies and the Love Bugs in Doon Valley Survey.

Countrywide Survey of Fireflies:

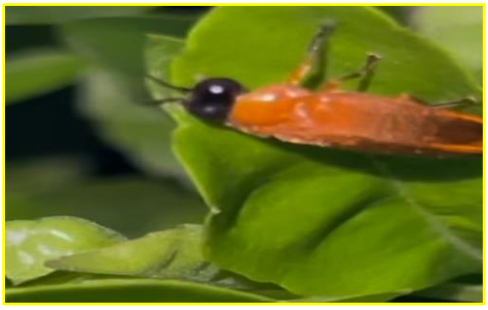
- The survey aimed to assess the diversity of fireflies across India, addressing the objective of conservation through research.
- By engaging citizens nationwide and collecting data from multiple states, the project promoted community participation, aligning with the foundation's objective of environmental education and awareness.
- The survey contributes to building cooperation and coordination networks by involving government agencies, institutions, grassroots community groups, and NGOs in data collection and research.

Love Bugs in Doon Valley:

This project focused on studying the population dynamics and ecological significance of love bugs in the region, contributing to biodiversity conservation efforts. Through the capacity building of community-based organizations and the involvement of local communities in data collection, the project promotes participatory approaches to conservation. By highlighting the threats faced by love bugs and advocating for conservation measures, the project supports the foundation's objective of reducing biotic pressure on forest areas and managing food resources.

The AMBER Foundation’s endeavours in conducting these surveys demonstrate its commitment to fulfilling its objectives and mission of conserving biodiversity through research, education, and community engagement. Through these projects and others, the foundation continues to strive towards creating a planet where biodiversity thrives, benefiting both nature and society. It’s been a year since the creation of the AMBER Foundation, and the society has completed two projects so far that meet its vision. The awareness generation of the local masses and conservation efforts regarding the fireflies and lovebugs in the Doon Valley were successful. It’s been a year since the creation of the AMBER Foundation, and the society has completed two projects so far that meet the vision of the society. The awareness generation of local masses and conservation efforts regarding the fireflies and lovebugs in the Doon Valley were done successfully. The details of these two projects have been briefly discussed below:

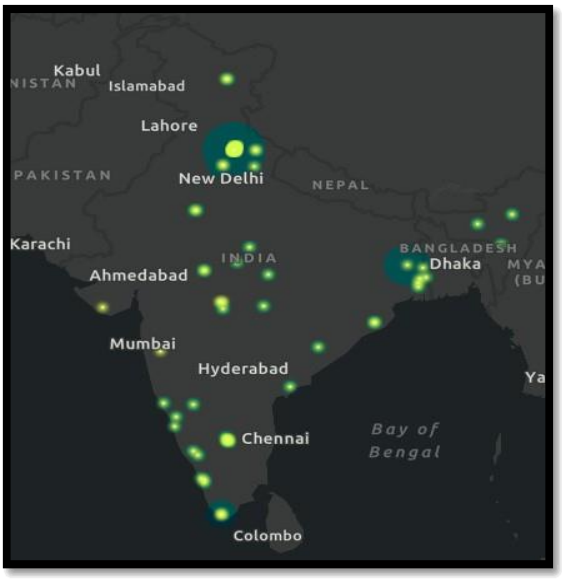
PROJECT-1

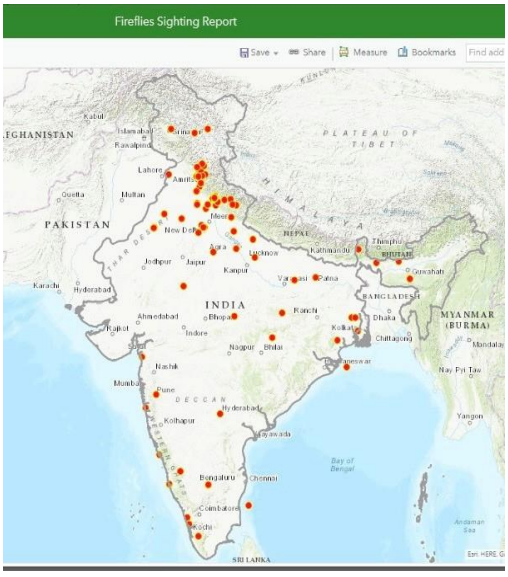


Countrywide Survey of Fireflies Conducted

A study was initiated by Dr. V. P. Uniyal and his student, Ms. Nidhi Rana, to assess the diversity of fireflies in Doon Valley. The survey was conducted on World Firefly Day in 2021, with over 71 people participating and submitting data from 14 states of India. The survey was repeated in 2022, with more than 170 people from 19 states participating.

The third consecutive year of the survey was organized on July 2nd-3rd, 2023, with over 3000 individuals participating. The survey aims to increase awareness about fireflies and engage more people in their knowledge. The survey serves as a reminder that conducting studies and surveys is not enough if society is not aware of them. aimed to assess the diversity of firefly species in India, given the lack of comprehensive studies in the country. Fireflies, belonging to the family Lampyridae under the order Coleoptera, serve as bioindicators of a healthy environment and play crucial roles in maintaining ecological balance by preying on garden pests like slugs and snails.





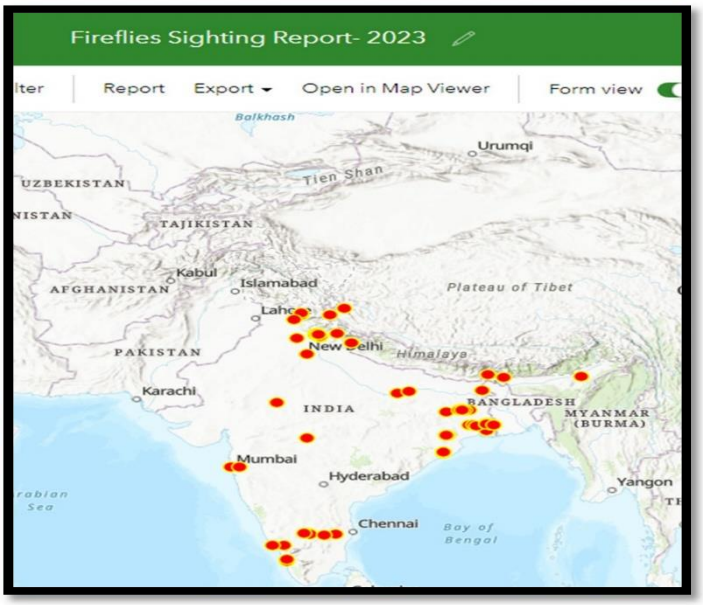
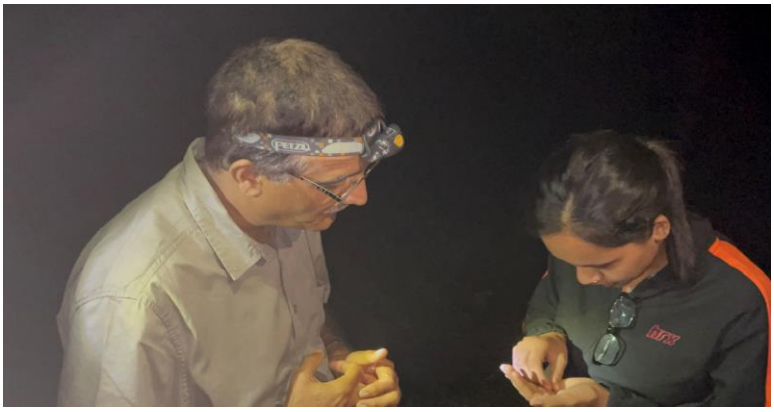


Fig.1. Map showing participation across the country in during thefirefly survey.



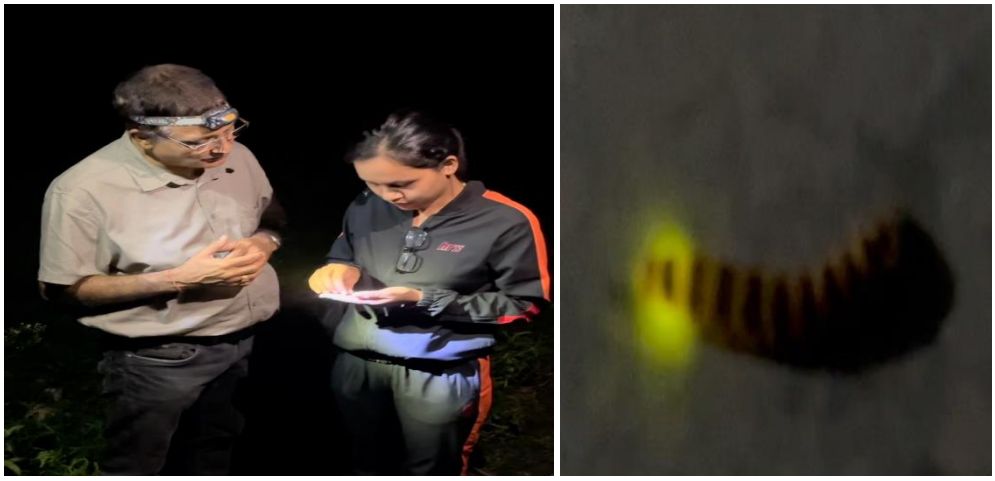
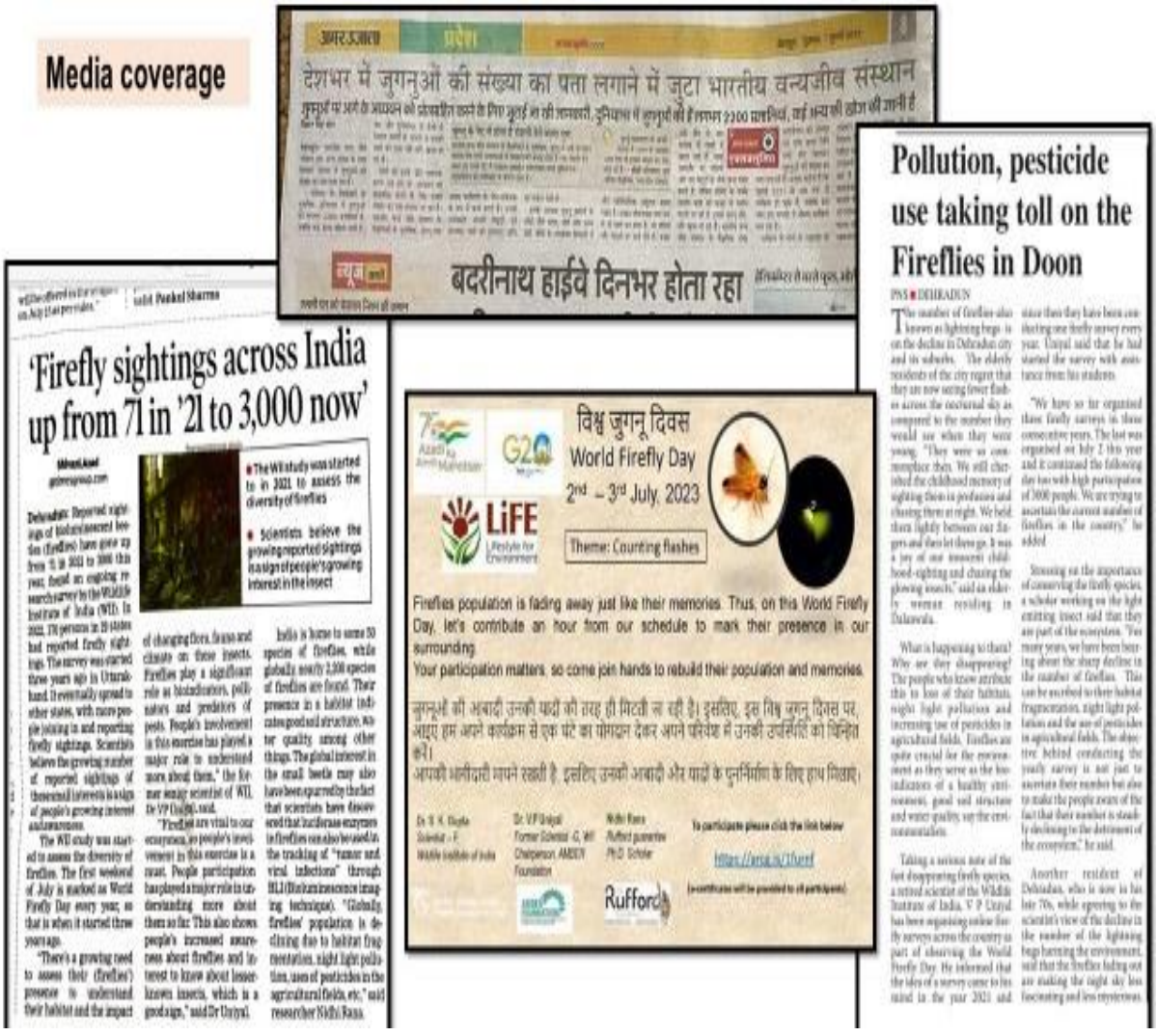


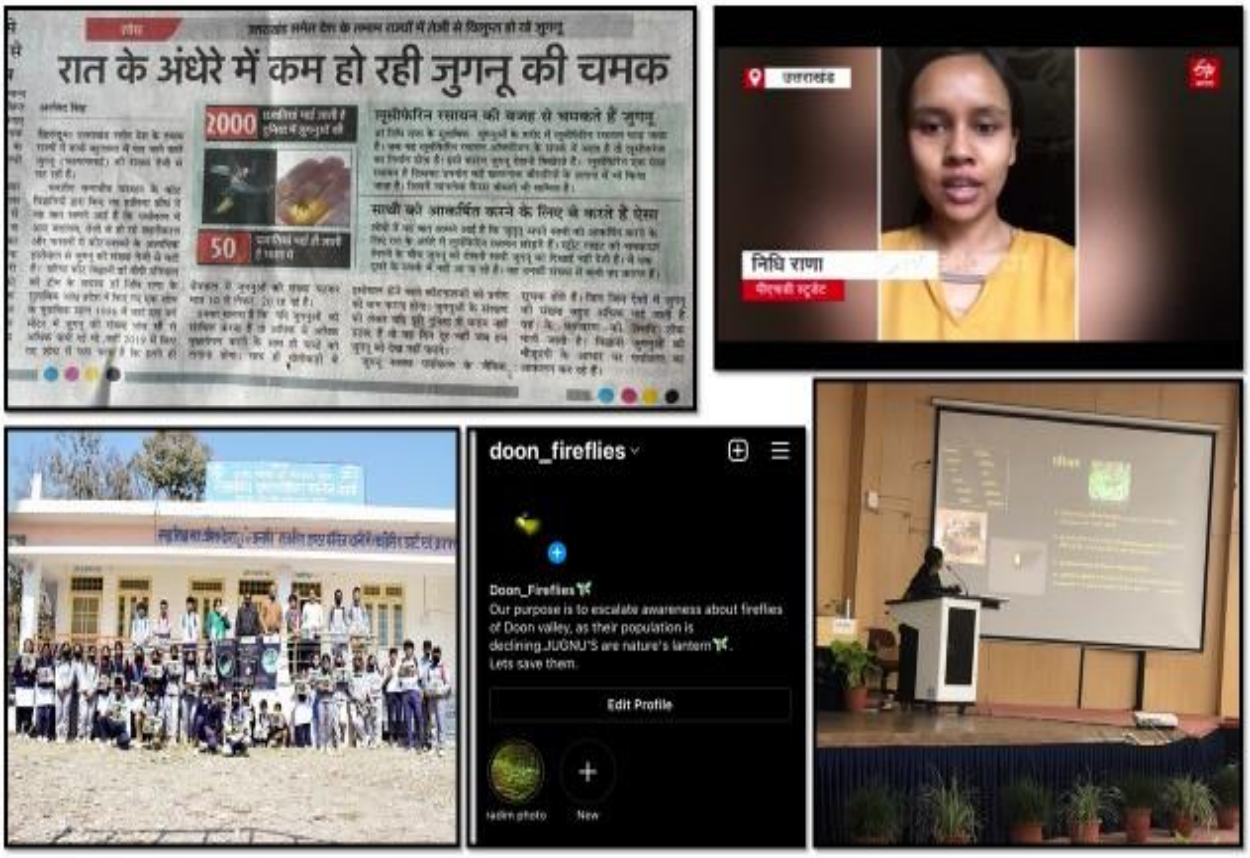
Figure 2- Fireflies Survey Conducted

Fireflies, a flashing beetle under the family Lampyridae, order Coleoptera, are essential bio-indicators of a healthy environment and potential predators of garden pests. They have a

lifecycle of 1-2 years and lay eggs on leaves and soil, hatching into larvae in 3-4 weeks. The larval stage is the largest in the firefly's lifecycle, metamorphosing into a pupa in 1-2 years. After emerging into an adult firefly, their lifespan is short.

The illuminating property of all stages from egg to adult is due to the presence of an enzyme-substrate complex, Luciferase-Luciferin, in their abdomen. This enzyme produces 100% conversion of energy, known as "Cold light," which is crucial for tracking tumour and viral infections through the “Bioluminescence imaging technique.”

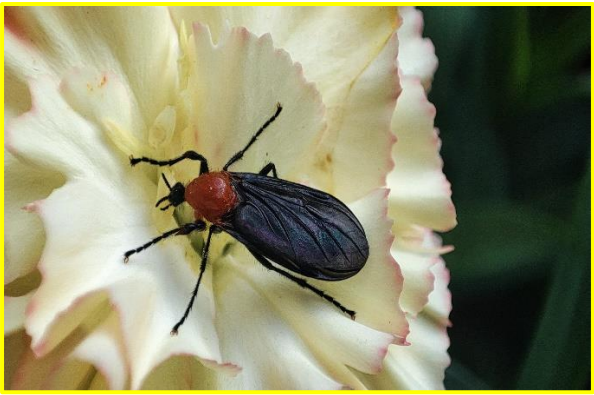
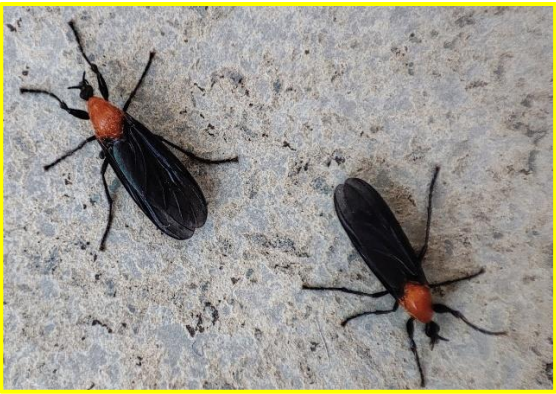




The enthusiastic participation reflects growing awareness and interest in firefly conservation. Additionally, the survey not only serves to collect data on firefly diversity but also aims to engage the public in understanding the importance of fireflies in the ecosystem. Despite their ecological significance, fireflies face threats such as habitat fragmentation, light pollution, and pesticide use, leading to population declines. However, their unique bioluminescent properties, driven by the enzyme-substrate complex luciferase-luciferin, offer potential applications in fields like bioluminescence imaging for tracking tumour and viral infections.

Overall, the countrywide survey highlights the importance of citizen science in biodiversity monitoring and underscores the need for continued efforts to conserve these fascinating insects.

PROJECT-2

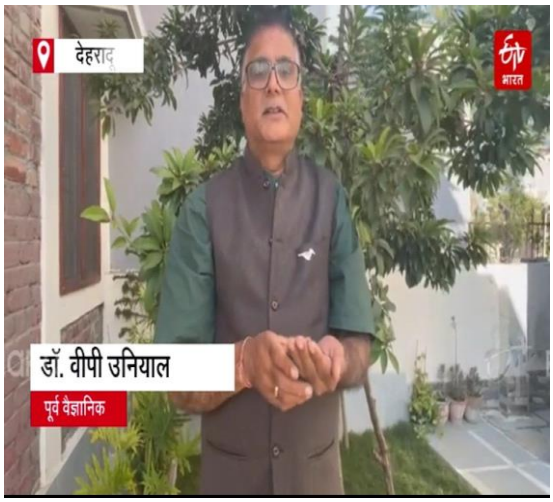
Love Bugs in Doon Valley: Harbinger of a Colder Season!

Dr. V.P. Uniyal and Dr. Vandana Mehrwar conducted a study in Doon Valley and observed the intriguing creatures, Lovebugs. They are black-coloured flies (Order Diptera of Class Insecta) with a reddish-orange thorax with one pair of wings as adults. Love bugs, scientifically known as *Plecia indica*, have made a notable appearance in the region, marking the onset of a colder season. The common name “lovebugs” has been given to these flies because they often fly while still coupled during mating. Adult lovebugs emerge after rainy periods and can be abundant locally. They are indicators of cool and clean weather. Recently large number of love bugs have been observed in large numbers in different areas of Dehradun adjoining to forest and agriculture fields.

These tiny creatures play a significant role as cool and clean weather indicators. Recent sightings have shown a large number of love bugs in various areas of Dehradun, particularly near forests and agricultural fields. Despite being flies, not bugs, they hold a special place in the entomological world due to their unique behaviour and ecological functions.

Description-wise, love bugs exhibit dark translucent wings, long black legs, and short antennae. Females are generally larger with narrow, elongated heads, while males are smaller with rounded heads. Their life cycle spans around six months, with two generations per year. Love bugs lay eggs either in spring or fall and develop into adults. Larvae feed on decaying plants, while adults feed on the nectar of flowers.

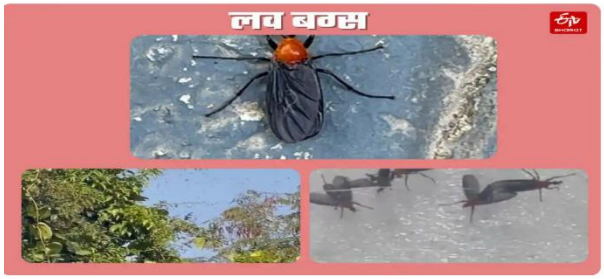
Media Coverage



ETV Bharat / State

खास हैं दून घाटी के लव बग्स, मौसम से है इनका कनेक्शन, शोधकर्ताओं से जानें कहानी

By ETV Bharat Uttarakhand Team
Published : Nov 29, 2023 at 10:59 PM IST



Love Bugs in central Himalayas दून घाटी सहित पूरे उत्तराखंड में सर्दियों का अहसास होने लगा है, लेकिन इस अहसास से पहले कुदरत के एक इशारे को बयां करते हैं मध्य हिमालय क्षेत्र में अपनी मौजूदगी देने वाले लव बग्स. क्या हैं ये लव बग्स जानिए इनकी कहानी शोधकर्ताओं की

ईटीवी भारत उत्तराखंड Uttarakhand

मादा लव बग आकार में होती है बड़ी: डॉ. वीपी उनियाल ने बताया कि सामान्यत मादा लव बग्स आकार में बड़ी होती है और उनका सिर पतला और लंबा होता है, जबकि नर छोटे होते हैं और उनका सिर गोल होता है. इनका वयस्क शरीर 5 से 12 मिमी तक होता है. अब तक, भारतीय हिमालय से बिबिओनिडी के परिवार के चार जीनस की 29 प्रजातियों की रिपोर्ट की गई हैं (चंद्रा आदि, 2018).

लव बग का जीवन चक्र: लव बग्स का सामान्यत: छह महीने का जीवनकाल होता है, इसलिए इसमें वर्ष में दो पीढ़ियां होती हैं. ये बसंत (अप्रैल-जून) या पतझड़ (अगस्त-अक्टूबर) में अंडे रखते हैं. प्रजनन के बाद, नर लव बग्स मर जाते हैं. प्रति मादा लव बग्स तकरीबन 100-350 अंडे देती है और कीट फूल-पत्ते खाते हैं. वयस्क के रूप में लव बग्स केवल कुछ हफ्तों तक जीते हैं.

These insects are not considered pests as they are harmless and do not bite or sting. However, their late appearances in recent years raise concerns among ecologists. Environmental changes such as habitat loss, pollution, pesticide use, and climate change are believed to disrupt their behavioural ecology and mating patterns.

To ensure the conservation of these fascinating creatures, efforts such as promoting organic farming, safeguarding habitats, biodiversity monitoring, and collaboration with citizen scientists are essential. Love bugs, despite their small size, play crucial roles in ecosystem health and deserve protection and conservation measures.

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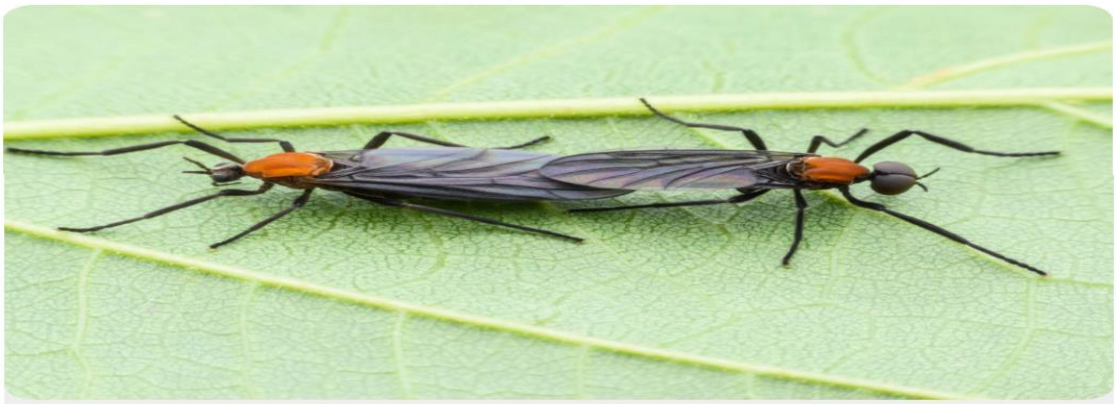
WIKIFARMER

Interesting facts about Love Bugs and their role in the ecosystem



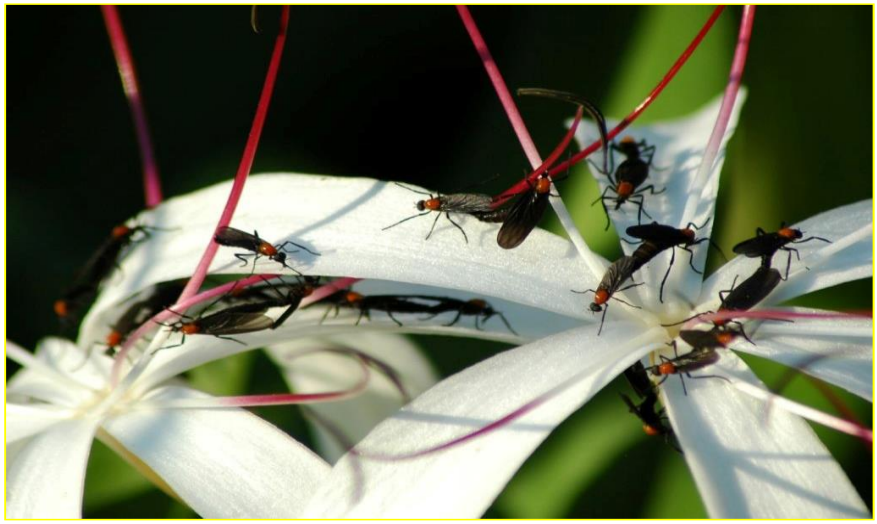
Agroecology

Link: https://wikifarmer.com/interesting-facts-about-love-bugs-and-their-role-in-the-ecosystem/

Changes in the life cycle of Love Bugs alarm ecologists

The cool (winter) season is love bug season! These bugs (though they're flies, not bugs) herald seasonal changes and are the harbinger of a colder season.

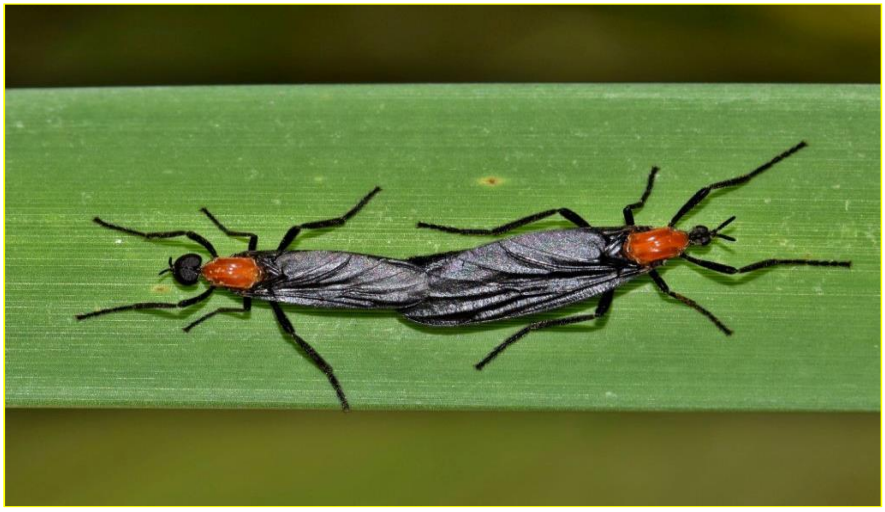
If you are an entomology buff, you might wonder:
What is this abrupt advent of teeny-weeny black creatures with bright orangish thorax lying all around in Doon Valley, Uttarakhand (India)?



Love bug information – Classification, Description, and physiology

The scientific name of this swarm of flies is ***Plecia indica*** (Brunetti, 1911). The species is classified to the family Bibionidae of the order Diptera (two-winged flies). They are addressed as love bugs or honeymoon flies because males and females remain united back-to-back during mating, even in flight. The pair will stay in this tandem position for several days long after mating.

- **Description:** Dark translucent wings, long black legs, and short antennae. Females are generally larger and have narrow, elongated heads, whereas males are smaller and have rounded heads. The adult body shows varying degrees of hairiness and measures 5 to 12 mm. So far, 29 species from four genera of the family Bibionidae have been reported from the Indian Himalayas (Chandra et al., 2018).
- **Life Cycle:** Love bugs usually have a life span of six months and hence have two generations per year. They lay eggs either in spring (April-June) or fall (August-October) and develop into adults. After mating, the males die and are dragged around by the females until they lay the eggs. Each female lays up to 100–350 eggs, and larvae feed on decaying plants. As an adult, love bugs live only a few weeks.
- **Habitat and Food Source:** The juveniles and larvae enjoy leaf litter and decomposed organic debris in a variety of terrestrial and aquatic settings. Large swarms of adults can be frequently sighted in terrestrial habitats near meadows, grassy hillsides, or decaying vegetation. They feed on the nectar of flowers and are relatively short-lived. Larvae feed gregariously on the roots andtubers of various crops.



Benefits and threats of Love Bugs in natural and Agricultural Ecosystems

Ecological function: They serve two key ecological functions: decomposition and pollination. They feed on the pollen and nectar of flowering plants and pollinate in the process. Despite these negative effects, flies are valuable decomposers, parasitoids, pollinators, food for birds and larger insects, and bio- indicators of water quality and ecosystem health (Courtney et al., 2009). They provide crucial ecosystem services such as biodegradation and natural recycling of organic materials. Several medicinal plants, crops, and meadow flowers depend on dipterans for pollination, and the loss of flies in particular regions would result in the extinction of the flora and vice-versa.

Pest Status: Large swarms of flies are a nuisance, but they are not considered pests. They are harmless, do not bite or sting, and are non-poisonous beings.

Threats: Most love bugs are sighted during September (in early fall), but for the last 3-5 years, they have been making late appearances, which may be a matter of concern. Ecologists attribute these delayed emergences primarily to anthropogenic activities and environmental changes such as habitat loss, pollution, indiscriminate use of pesticides, and climate change, all of which disrupt the phenology of late floral blooming and eventually affect the behavioral ecology of the insects. It may also interfere with their mating patterns, navigation, and interactions with other species in the ecosystem.

Conservational Efforts: Considering the threats they face, we must act to ensure their conservation. These tiny mini-creatures can be protected through encouraging organic farming, safeguarding their habitat, biodiversity monitoring, pollution control, collaboration with citizen scientists, etc.

PROJECT-3

Recently, a pollinator monitoring team has been constituted involving the students of Graphic Era (Deemed to be University), Dehradun. The watchdogs will initiate the comprehensive assessment of pollinator populations across various ecosystems in the surrounding regions of the Doon Valley. Their mission encompasses not only the identification and documentation of pollinator species but also the evaluation of their abundance, distribution, and behavior. By conducting systematic surveys and employing modern techniques such as transect walks, insect traps, and pollen analysis, the team aims to generate valuable data on pollinator dynamics. This initiative seeks to shed light on the crucial role of pollinators in ecosystem health and food security while fostering hands-on learning experiences for the participating students. Through collaborative efforts with local communities and conservation organizations, the pollinator monitoring team endeavors to contribute towards informed conservation strategies and sustainable land management practices.