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A study on the biodiversity and abundance of insect species in Balipara, Assam, India

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Abstract
Insecta is a massive and highly diverse group of animals on earth. The diversity of this group widely depending on the climatic, ecological and edaphic factors which is why every nook and corner of the earth is composed of different composition of insects. This study was conducted to estimate the diversity of insect species in different sites of Balipara, Assam, India which is located near to the Nameri National Park. A total of 32 species distributed over 23 families belonging to 9 orders were reported from this area. The dominant order was found to be Lepidoptera followed by Coleoptera. The other orders recorded were Diptera, Orthoptera, Hemiptera, Hymenoptera, Odonata, Dermaptera and Blattodea. This study will be helpful in detailed exploration of the insect species in that particular area.

Keywords: Assam, biodiversity, conservation, insecta, pollinator

Introduction

With 1.5 million species constituting approximately three fourth species of the animal kingdom, the class Insecta is a massive, diverse and highly successful group of animals [1-2]. These tiny creatures despite its small body size, play a significant role in the ecosystem ecology of a particular area. Insects are a key bio-indicator species for environmental changes as they have the ability to distinguish between polluted and non-polluted air pollution loads [3]. They act as herbivores, scavengers and detritivores, predators, parasites and hence play a crucial role in sustaining ecosystem health and energy flow. Insects are important not just for the ecosystem, but also for human food supply. Insect predators are recognized to be more effective in controlling economically destructive insects than many insecticides [4-6]

India, with its four biodiversity hotspots, has a huge biodiversity not only of higher animals, but also in terms of number of insect species which are distributed over a wide range of landscapes, climate and altitudes. The book "Indian Insect Life" reported 25,700 species of insects from different parts of the country [7]. In recent estimate 59,353 insect species belonging to 619 families have been recorded from India [5]. Varshney (1998) [8] reported that in India, different species belonging to 27 orders are found, among which Coleoptera is the dominant order with approximately 15,500 species followed by Lepidoptera, Hymenoptera, Diptera and Hemiptera. The insect species composition of different regions of the country has a remarkable difference. The distribution is influenced by climatic, ecological and edaphic factors such as rainfall, temperature and vegetation. The diversity in the Himalayan zone is mainly influenced by Palaearctic factors whereas the diversity in the dessert zone, both the hot and cold dessert zone, is influenced by its extreme temperatures. Again, the tropical humid zone like the eastern Himalaya and western ghat has different species composition than that of island ecosystems, which harbours a great number of endemic species [9]. Because of this wide range of divert, study of the insect composition of every nook and corner of the country is of a great importance.

Assam, being a state in the foothills of the mighty Himalaya, is rich in biodiversity, including mammals, birds, reptiles, amphibians, freshwater animals, angiosperms, soil creatures, insects, and so on probably due to its diverse geographical features. Insects make up a significant portion of biodiversity in Assam. A total of 3639 insect species belonging to different genera have been reported till date. Assam has a rich diversity in insect species which are still yet to be explored [9].

This study was conducted to determine the insect diversity of some specific parts of Balipara, which is situated in Sonitpur district, Assam, India. As Balipara is situated too close to Nameri National Park and Forest Reserve, the vegetation of Nameri also impacts the diversity of this region. Till now no scientific investigations has been conducted to estimate the diversity of this area and hence this effort was made that will be a great aid to future researchers.

Materials and methods

Study area

The present study was carried out in 3 villages named Molanpukhuri, Eragaon and Bokagaon situated in Balipara of Sonitpur district of Assam. The latitude 26.82735 and longitude 92.78354 are the geocoordinate of Balipara. It is located 32 kilometer towards west from the district headquarter Tezpur and 16 km from Nameri National Park and Forest Reserve. The study was conducted between the month of March to the month of June, 2021. The average rainfall of the study area during the study period was recorded to be 315.65mm. The temperature ranged from 22.9°C to 27.5°C. Average humidity was 76.25%.

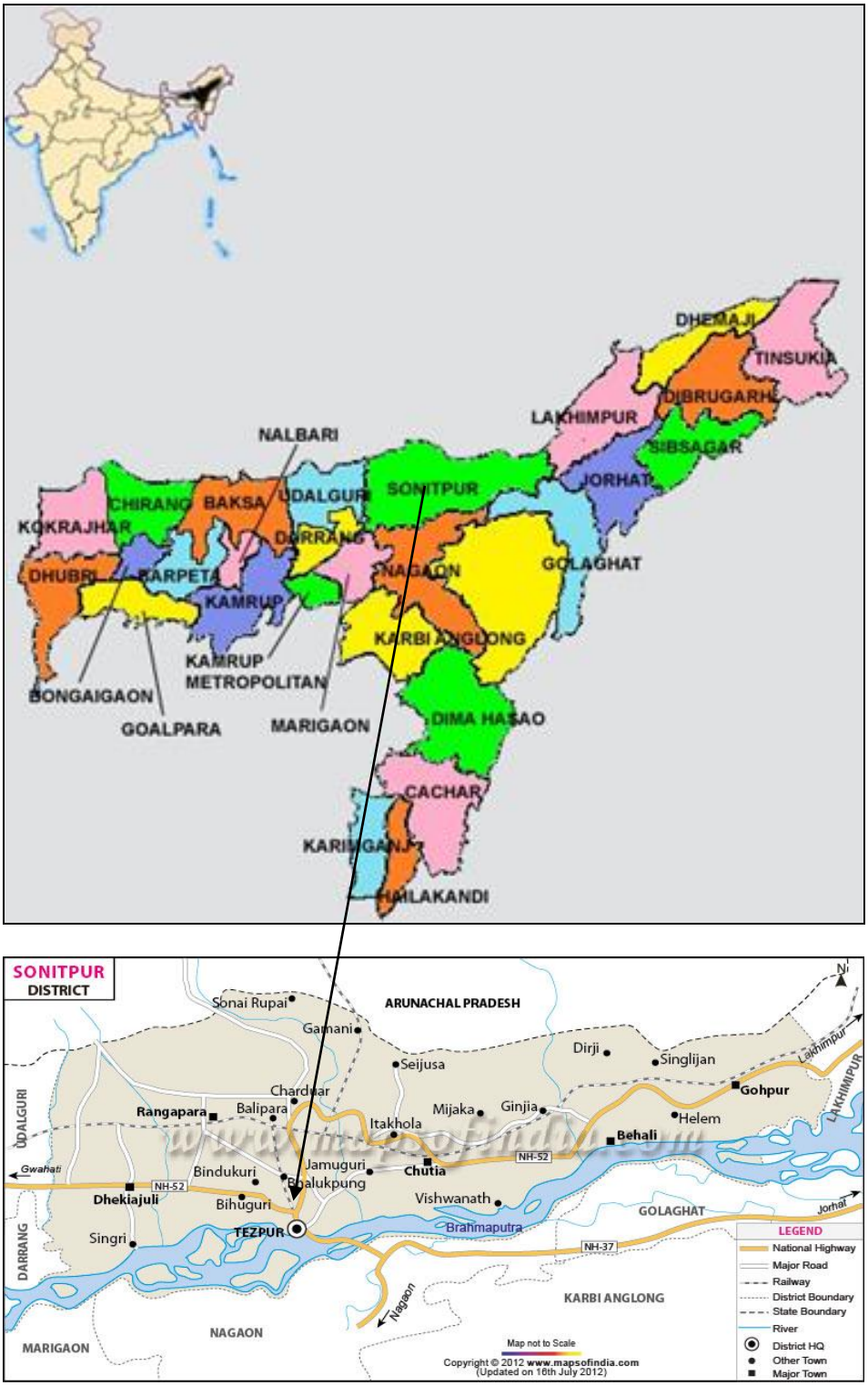


Fig 1: Map showing the study area (Source: www.google.com)

Collection and Identification

The survey of the area was done sticking to Covid-19 protocols and maintaining the timing provided in the SOP issued by Government of Assam. The active flying insects were collected using collecting net and others were collected by hand picking. Pictures of insects were clicked and stored using a phone camera. The collected insects were not preserved due to the unavailability of materials for preservation due to the pandemic. The insect species were identified with the help of internet through various websites and books.

Result and Discussion

A total of 32 species distributed over 23 families belonging to 9 orders were reported. The species with their families are represented in table 1. Among them, the dominant order was found to be Lepidoptera with 9 species followed by Coleoptera with 8 species. The other orders recorded were Diptera, Orthoptera, Hemiptera, Hymenoptera, Odonata, Dermaptera and Blattodea.

Table 1: List of insects recorded from Balipara region of sonitpur district, Assam, India

Order	Family	Common name	Scientific name
Lepidoptera	Erebidae	Indian owlet	*Spirama helicina*
		Yellow tail moth	*Euproctis similis*
		Great Eggfly butterfly	*Asota ficus*
		Olepa moth	*Olepa ocellifera*
	Nymphalidae	Spotted palmfly	*Elymnias malelas*
		Striped tiger butterfly	*Danaus genutia*
	Hesperiidae	The great swift	*Pelopidas assamensis*
	Crambidae	Hollow-spotted blepharomastix moth	*Blepharomastix ranalis*
	Plutellidae	Cabbage moth	*Plutella xylostella*
Coleoptera	Cerambycidae	Teak trunk borer	*Stromatium barbatum*
		Monkeypod round-headed borer	*Xystrocera globosa*
		Bamboo tiger longicorn	*Chlorophorus annularis*
	Scarabaeidae	Flower chafer	*Mimela splendens*
		Molossus beetle	*Catharsius molossus*
		Rice beetle	*Dyscinetus morator*
		Shining leaf chafer	*Anomala innuba*
	Tenebrionidae	Darkling beetles	*Helops rossii*
Diptera	Tephritidae	Melon fly	*Bactrocera cucurbitae*
	Stratiomyidae	Black soldier fly	*Hermetia illucens*
	Dolichopodidae.	Long-legged flies	*Dolichopus sp.*
	Tipulidae	Cranefly	*Nephrotoma cornicina*
	Sarcophagidae	Common flesh fly	*Sarcophaga carnaria*
Orthoptera	Tettigoniidae	*Bush-crickets*	*Hexacentrus japonicus*
	Acrididae	Short-horned grasshopper	*Gesonula mundata*
	Tetrigidae	Hooded grouse locust	*Paratettix cucullatus*
Hemiptera	Reduviidae	---	*Tapeinus fuscipennis*
	Rhyparochromidae	Dirt-colored seed bug	*Metochus uniguttatus*
	Pentatomidae	Green stink bug	*Chinavia hilaris*
Hymenoptera	Formicidae	Red ant	*Oecophylla smaragdina*
Odonata	Libellulidae	Green marsh hawk	*Orthetrum sabina*
Dermaptera	Forficulidae	European earwig	*Forficula auricularia*
Blattodea	Blattidae	Cockroach	*Periplaneta americana*

The species identified from the region were distributed over 23 families and a total of 32 species were identified. Maximum species were identified from order lepidoptera was 9 belonging to 5 families out of which 4 species were from Erebidae, 2 from Nymphalidae, and 1 species from Hesperiidae, Crambidae and Plutellidae families. Coleoptera was second most abundant order in this area with 8 species belonging to 3 families; 4 from Scarabaeidae, 3 from Cerambycidae and 1 from Carabidae. Diptera was recorded with 5 species belonging to 5 families i.e., Dolichopodidae, Stratiomyidae, Tephritidae, Tipulidae and Muscidae. Order Orthoptera was recorded with 3 species belonging to 3 families i.e., Tettigoniidae, Acrididae and Tetrigidae. Order Hemiptera was also recorded with 3 species belonging to 3 families i.e., Reduviidae, Rhyparochromidae and Pentatomidae. Hymenoptera, Odonata, Dermaptera and Blattodea were recorded as least abundant orders with 1 species each belonging to families Formicidae, Libellulidae, Forficulidae and Blattidae respectively.

From this study, the richness and abundance of lepidoptera order was found to be dominant with the highest number of species which is in accordance with the findings of Jana (2014), Bhat (2018), Painkra and painkra (2018), and Jana *et al.* 2021 [3, 10-12]. This finding also has similarities with the findings of Rajkumari *et al.* (2014) who studied the distribution pattern of hymenopteran insects in Jorhat district, Assam [13].

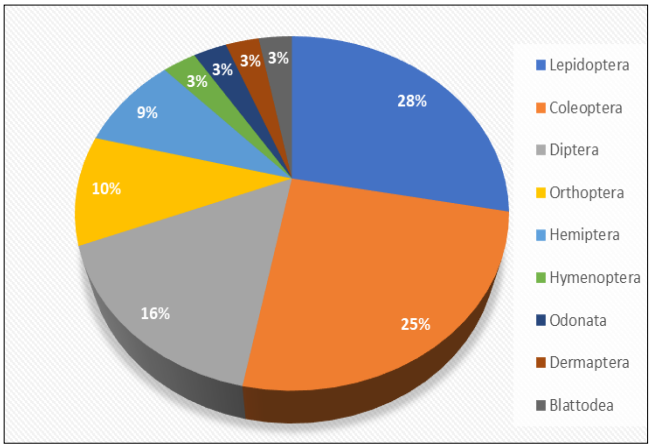


Fig 2: Insect species composition under different orders

Table 2: Diversity indices of the area

Diversity Indices	Values
Species Richness	32
Simpson's index	0.930
Shannon-wiener	3.039
Pielou's Index	0.877

To measure species richness, evenness, and overall diversity, a variety of diversity indicators were used to evaluate the insect biodiversity of Balipara, Assam. The computed values provide significant information on the ecological dynamics of the research region. First of all, Balipara's high species richness of 32 suggests a varied insect population with a significant variety of species coexisting in the environment. The Simpson Diversity Index value of 0.930, which indicates a highly diversified and uniformly dispersed population in which no single species excessively dominates the ecosystem, further supports this diversity. The significant complexity and diversity of the insect population are highlighted by the Shannon-Wiener Index value of 3.039, which also suggests a robust and stable ecosystem that can support a large variety of species. The comparatively high level of evenness in species distribution indicated by Pielou's Index of Evenness score of 0.877 further highlights the balanced character of the insect community in Balipara. When taken as a whole, these diversity indices imply that Balipara is home to a rich, varied, and harmonious community of insects, which is a sign of a thriving and biologically varied ecosystem.

Conclusion

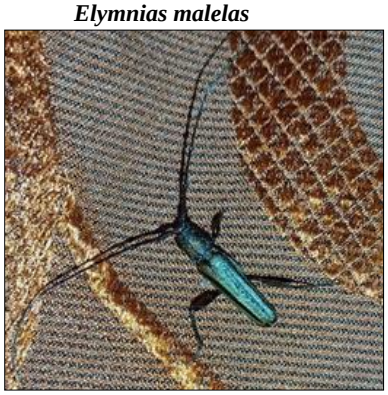
The present study depicts the insect composition of some selected area of Balipara region and it reveals that the study area has a good number of insect diversity. The diversity and distribution might be due to the healthy environment and availability of their natural niche. This study has been conducted facing various constraints like limited time and marginal facilities due to Covid-19 restrictions and protocols. There is abundant opportunity to do rigorous survey work in every nook and cranny of this area in order to properly document the insect species. The detailed inventory of the insect species will not only help in its conservation but also be helpful in environmental impact and assessment.

Photo Plate

Elymnias malelas

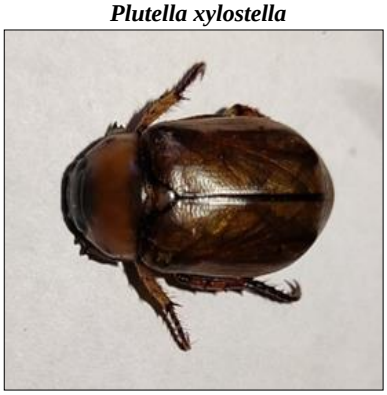
Stromatium barbatum

Plutella xylostella



Xystrocera globose

Dyscinetus morator



Anomala innuba

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