

PROPOSED ACTIVITIES TO ACHIEVE PROJECT GOALS

Both the objectives are interconnected. Following activities are planned to fulfill the objectives:

Collection of moths will be done from the proposed area to study the pollen loads. During collection surveys, observation of moths visiting different flowers will be done.

Types of forests and species diversity of plants/crops surrounding the light traps will be noted down.

Pollen grains will be separated from the proboscis, head and neck region of the collected moths.

Identification of moths and pollens will be done.

A consolidated checklists of moths pollinating different floral components will be prepared.

Another checklist of forest trees, crops, fruit plants of Himalayan region of three states of NE India, which are exclusively or partially pollinated by moths, will be prepared.

FOCUS AREA OF ACTION

Forest ecosystems and major agrarian ecosystem in HR of Sikkim, Arunachal Pradesh and West Bengal.

PERFORMANCE INDICATORS

Moth species pollinating different floral components.

Pollens of different plant species collected from moths.

RELEVANCE OF THE PROJECT TO NATIONAL PRIORITIES

Most of the studies (except very few) on plant-pollinator network have focused on diurnal interactions. The present study will be based on plant-moth interactions, a nocturnal and so far neglected type of interaction. The present study will provide accurate and complete picture of ecosystem structure and function in the IHR. Exploring links across boundaries between networks (such as between diurnal and nocturnal networks) will lead to increased modularity for conservation and management of Himalayan Ecosystem.

Knowledge of Plant-moth interaction will help in conservation of rare, endemic or threatened germ plasma for the long term management of Himalayan Ecosystem.

It is a well known fact that the IHR is a home to innumerable floral and faunal species, which are directly or indirectly servicing the mankind. Various agricultural crops, fruits, spices, etc. grown by the locals for their livelihood are dependent on the pollinators. Therefore, knowhow of the plant-moth interaction and knowledge about the floral components pollinated by moths will help in the proper management of forest and agriculture ecosystems of IHR. This will pave a way for implementation of policies for the sustainable development of the region.

This study will provide knowledge about alternate pollinators and will help for lesser dependency on diurnal pollinators for different agriculture and forest produce. It will help in boosting the economic condition and livelihood of the local residents and farmers.



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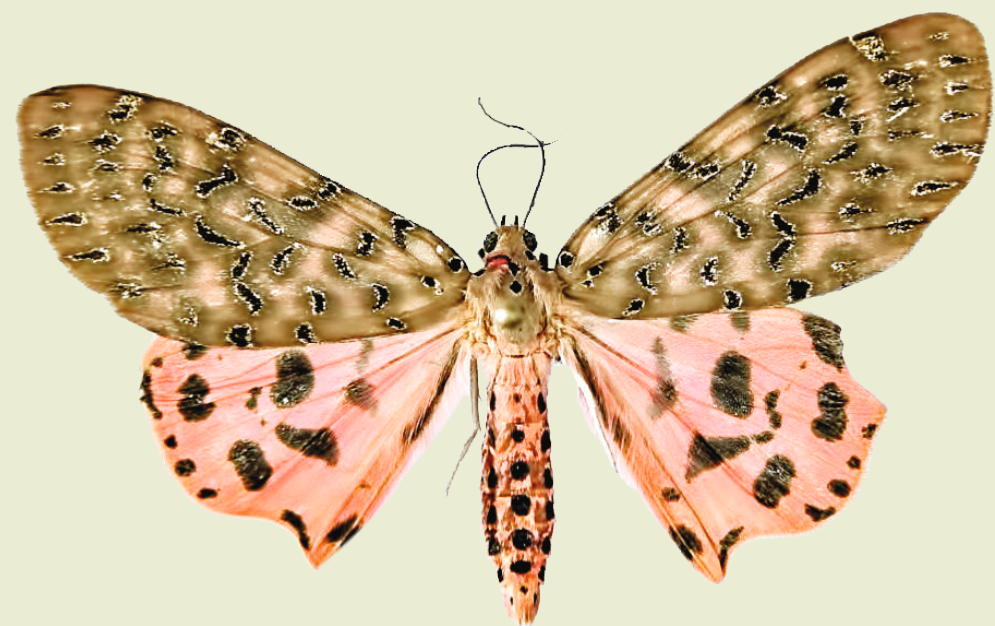
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ASSESSMENT OF MOTHS (LEPIDOPTERA) AS SIGNIFICANT POLLINATORS IN THE HIMALAYAN ECOSYSTEM OF NORTH EASTERN INDIA



OBJECTIVES

To prepare a check list of moth species pollinating different plants and crops in Central and Eastern Himalaya of India.

To prepare a checklist of plant species and crops of Central and Eastern Himalaya of India which are partially or exclusively pollinated by the moths.

PROJECT AREA

The project is based on the Indian Himalayan Region of Three states of North East India: Arunachal Pradesh, Sikkim, West Bengal.

ISSUES/ PROBLEMS TO BE ADDRESSED IN THE PROJECT

As discussed, around 90% percent of the world's flowering plants are pollinated by animals (Ollerton et al. 2011). Therefore, in the long term, pollinators are inseparably essential for the genetic exchange among the individuals and continuation of the floral and its dependent faunal germ plasm from one generation to another. But, worryingly, pollinators in general and moth population in particular are known to be undergoing significant declines in several European countries (Macgregor et al. 2015). According to Fox et al., (2013), two third of the common large moth species population declined over a period of 40 years. This is of great concern because pollination represents a critical ecosystem service (Costanza et al., 1997; Ollerton et al., 2011; Garibaldi et al., 2013) and therefore, the situation is alarming the bells for taking curative actions. Furthermore, we know, the Himalayan ecosystem is a very fragile at the stage and many of the natural pressures are working for its maturation. In this natural system, the drastic anthropogenic activities are accelerating the disturbing pattern of habitat loss, distribution ranges and population decline of Pollinators. This will have cascading effects on the ecosystem functioning, will be directly affecting the lively hood of the local populations and will have the long term negative effects on the sustainable development of the Nation.

In this situation, the present project will help in providing a detailed information about moths pollinating different plants and crops, and conversely, the details of plants pollinated (partially or exclusively) by moths. This will help in the overall understanding of the complex system of plant-pollinator relational ship and their role in the economic development and well being of the local communities and other residents of area.

Out of the total flowering plants of the World, about 90% are pollinated by animals (Ollerton et al., 2011). The reproduction of around 70% of the plants is probably, to some extent, pollen limited (Ashman et al., 2004). Therefore, pollination represents an important ecological process, a service provided by a range of animals. This is the process which is extremely essential for the long-term population stability of flowering plants (Kearns et al., 1998) on which, finally, the faunal diversity and different ecosystems of the World depends. Till date, most of the pollination related studies are based on the diurnal pollinators and the contribution and role of nocturnal pollinators have been broadly neglected and underestimated (Macgregor et al., 2015). This led the scientific world devoid of 50% of the knowledge about pollination services by different faunal components. Nowadays, some studies are establishing nocturnal flyers, particularly the moths as important pollinators and revealed that nocturnal pollinators in general and moths in particular are indeed important for the continuation of floral as well as its dependant faunal generations.

Moths are the nocturnal Lepidopteran Insects and are taxonomically characterized with the wings having dense covering of scales, and mouthparts modified into proboscis (except in few of the very primitive moths). Moths are species rich and constitute about 9 % of the total Animal kingdom. They exhibit high diversity and act as a vital role player in the overall functioning of our ecosystems and improvement of ecological health.

Largely, the present project will be dealing with the exploration of moths involved in pollination of different flowering plants in IHR of Sikkim, West Bengal and Arunachal Pradesh.



IMPORTANCE OF MOTHS IN HIMALAYAN ECOSYSTEM

Moths are the Lepidopteran insects of Phylum Arthropoda. Among the layman, the familiarity of Lepidopteran insects is mainly due Butterflies, the most conspicuous group of Insects. Whereas, this is only about 14 % of their night counterparts, the moths, probably one of the lesser explored groups of Insects. Butterflies and Moths can be separated due to the following characters: generally, butterflies are diurnal and moths are nocturnal; butterflies have the clubbed antennae and moths have a different type of antennae, except clubbed, and moths have the frenulum or jugum as wing coupling apparatus whereas, butterflies lack these structures.

Within Lepidoptera, having 1,58,570 species Worldwide, moths with 1,38,656 species constitute about 88% of the total Lepidoptera and about 9 % of the total Animal kingdom. As far as Indian fauna is concerned, moths are known through about 12000 described species.

Many of the moth species are of great aesthetic value, important ecological indicators, pollinators, biological control agents, model organisms for Environmental survey, monitoring and conservation policies. On the other hand, the larval stage of many moth species are notorious pests of different crops, forest trees, ornamental plants, and thus cause a considerable economic loss to the mass. Therefore, moths act as a vital role player in the overall functioning of our ecosystems and improvement of ecological health.

