# Emerging of Insect Pests in Agricultural Area of Surandai, Tenkasi District, Tamil Nadu

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***Abstract*** **- One of the major challenges to humankind is threat to food security due to emerging and invasive pests. Increased global trade in agriculture has increased the chances of the introduction of exotic species. The field investigation started from August 2020 to October 2020 at Surandai, Tenkasi district. In the Present study revealed that total 16 insect species belonging to 6 orders and 11 families were identified in the study area .Out of that 9 edible insect and 7 invasive insect species were identified. During the study it was revealed that the order Lepidoptera found to dominant with 7 species followed by Orthoptera with 3species, Odonata and Blatella with 2 species, Scorpion and Dermaptera with 1 species. The comparsion on feeding gulit were assessed for insect species in the study area, 69% of insect were herbivores, 25% of insect were carnivores, and only 6% of insect were omnivores. The Shannon's diversity index is higher in October month (-2.63) and lower in August month (-2.54).Hence the present study review the situation of emerging insect pests of crops is discussed along with the probable reason for changing the pest status.**

***Index Terms*** **- Emerging, exotic species, humankind and investigation.**

## INTRODUCTION

Biodiversity is variation of life and refers to all species of plants, animals and Microorganisms existing and interacting within an ecosystem. This biodiversity performs a variety of ecological services in an ecosystem, which support one another and work together to form a stable and sustainable ecosystem. Traits are defined as physical or behavioral characteristics that evolve in response to competitive interactions and abiotic conditions (Woodcock, *et al.*, 2014). The pest reported from an area on a particular crop whose population has been increasing considerably over a period of time causing or likely to cause economic damage is termed as an emerging insect pest. In agricultural ecosystems the important ecosystem functions, mostly provided by insects, are systematically removed. Insect pests are created through the manipulation of habitats by humans, where crops are selected for larger size, higher yields, nutritious value, and are cultivated in monocultures for maximum production. The most important pollinators are bees, beetles, butterflies, and flies (Kim, 1993).

Insect herbivores change the quality, quantity, and timing of plant detrital inputs and can potentially have large effects on ecosystem cycling. (Mattson and Addy1975, Belovsky and Slade 2000).Changes in insect herbivore due to which more sap feeding insects emerging as major pests when plants are grown at elevated levels of carbon dioxide is known .Insects have been hugely successful in terms of both species richness and abundance and insects and terrestrial arthropods are seen to be the largest contributors to species richness (Stork *et al.*, 2015).The intensification of agricultural production systems in combination with high agrochemical input in crop fields, are the primary causes for the rapid decrease of biodiversity (Robinson and Sutherland 2002). In India, a total of 255 species of edible insects are recorded so far and it is mostly practiced in Northeastern State of India however few tribes from Tamil Nadu, Karnataka, Kerala, Odisha, Madhya Pradesh and Indian Andaman Islands use termites, locusts, ants and bees as food. The most commonly consumed insects worldwide belongs to order Coleoptera (31%), Lepidoptera (18%), Hymenoptera (14%), Orthoptera (13%), Hemiptera (10%) and 3% each of Isoptera, Odonata and Diptera. This study will be helpful in knowing the emerging of insect pests in agricultural area and their extent of damage so that proper control measures can be used in future to minimize the insecticides.

## OBJECTIVES OF STUDY

The present study is to investigate the biodiversity of agricultural insect at surandai, Tenkasi district. The

present work is examined under the following objectives

1. To provide general information of this area and its insect diversity for future studies.
2. To determine feeding habit of Insect pest.
3. To determine ecosystem services by insect.

## STUDY AREA

Surandai is located at 8.977272°N 77.420568°E. It has an average elevation of 132 metres (433 feet).It is situated 20 km from Coutrallam Falls, 12 km away from Tenkasi and 50 km from Tirunelveli, District .It is 30 km away from Sankarankovil and Surandai, which was one of the village with primarily agricultural and palm tree cultivation with allied activities.

## METHODOLOGY

Insect species diversity, richness and abundance were recorded from the study area in the month from August 2020 to October 2020 at Surandai area Tenkasi district. The study area consists of variety of agricultural crops and huge variety of insect biodiversity. The insect counts were carried out in the morning 6.00 am to 8.00 am and in the evening 4.00 pm to 6.00 pm. Insect pest were collected with the help of two methods, hand picking and by using nets. Photographs were taken for documentation during the study. The insect was identified by using the browser, research paper, journals and standard taxonomic literature.

Data analysis: Biodiversity of a community, a simple survey of the number of different species (species richness) in an area seemingly would give a clear picture of the diversity.

(i) Species richness : Total number of insect species recorded in a particular area.

(ii) Relative abundance: It is the number of insects of a particular species as a percentage of the total insect population of a given area. It is given by:
Pi= Ni/N x 100

*(iii)* Species diversity : For this, the shannon's index of diversity was calculated which is measure of diversity.
*H'=Σ pi In pi*

Where: H = the Shannon diversity index, Pi = fraction of the entire population made up of species i, S = numbers of species encountered, Σ = sum from species 1 to species S.

## RESULTS

List of insect species in the study area were given in Table -1. Total no of insect observed and their diversity in the study area were given in Table -2. The status of insect species available in each order wise was depicted in Figure -1. The comparison of edible and invasive insect in order wise is represented in Figure -2. The feeding guild of insect species were observed in study area are denoted in Figure – 3.

*TABLE: 1 LIST OF INSECT SPECIES IN THE STUDTY AREA*

| S. no | Order | Family | Common name | Scientific name |
|---|---|---|---|---|
| 1. | Blatella | Ectobiidae | German cockroach | *Ootheca blatella* |
| 2. | | | German cockroach | *Blatella germatica* |
| 3. | Dermaptera | Lampyridae | Neon insect | *Crazy neon bugs* |
| 4. | Lepidoptera | Nymphalidae | Forest giant owl | *Caligo eurilochus* |
| 5. | | | Indian common crow | *Euplora core* |
| 6. | | Pieridae | Imported cabbage worm | *Pieris rapae* |
| 7. | | Geometridae | Sub angled wave moth | *Scopula nigropunctata* |
| 8. | | Erebidae | Asian gypsy moth caterpillar | *Lymantriadispar asiatica* |
| 9. | | Pieridae | Brimstone | *Gonepteryx* |
| 10. | | | Grass yellow | *Eurema hecabe* |
| 11. | Odonata | Acrididae | Javanese grasshopper | *Valanga nigricornis* |
| 12. | | Platycnemididae | Copera vittata | *Blue bash dart* |
| 13. | Scopiones | Buthidae | Arizona bark scorpion | *Centruoides sculpturatus* |
| 14. | Orthoptera | Acrididae | Common field grasshopper | *Chorthippus brunnes* |
| 15. | | | Carolina grasshopper | *Dissosteria* |
| 16. | | Gryllidae | Crickets | *Grylloidea* |

TABLE: 2 TOTAL NO OF INSECT OBSERVED AND THEIR DIVERSITY IN THE STUDY AREA

| S.no | Month | Total number of Insect (Species Richness) | Shannon's index |
|---|---|---|---|
| 1. | August | 229 | -2.54 |
| 2. | September | 197 | -2.56 |
| 3. | October | 177 | -2.63 |

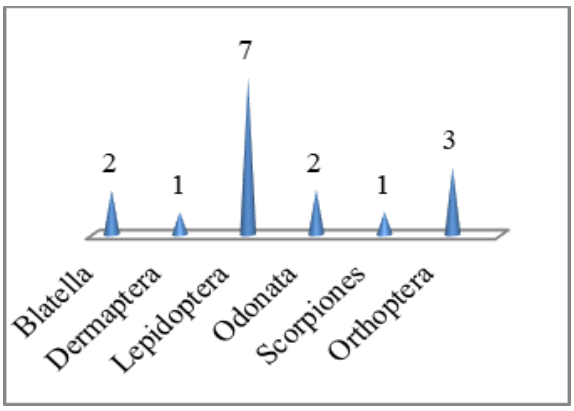


Figure: 1 Status of available Insect species in each order

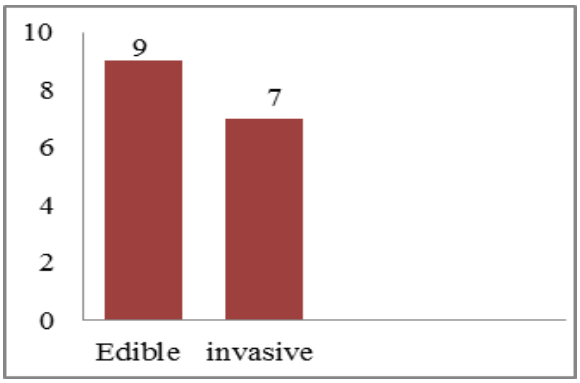


Figure: 2 Comparison of edible or invasive insect in study area

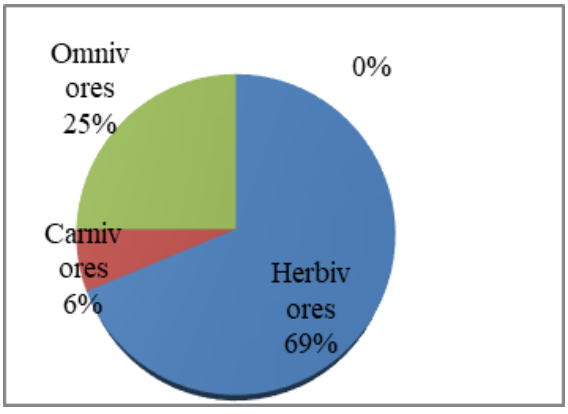


Figure: 3 Feeding Habitats for Insect species in study area

## DISCUSSION

Surandai area Tenkasi district has a rich insect biodiversity. There are large numbers of agricultural fields. The survey of the agricultural fields in and around the village was done in the month from August 2020 to October 2020.

In the present study 16 insect species belonging to 6 orders and 11 families were identified in the study area. During the study it was revealed that the order Lepidoptera found to dominant with 7 species followed by Orthoptera with 3species, Odonata and Blatella with 2 species ,Scorpion and Dermaptera with 1 species (Table-1).In August the maximum of 229 individual numbers of insects belonging to 16 species were recorded in the agricultural crop. Minimum number was recorded in October month (177).Shannon's diversity index is higher in October month (-2.63) and lower in August month (-2.54) as show in Table-2 .The Shannon's index is changed based on the climatic conditions; October month is moisture and rainy season. The rainy season insect species increase. So, October month the Shannon;s diversity index also increase. Diversity is low in August because there are still plenty of sunshine and hot temperatures so insect species in decrease and Shannon's index also decrease (Chapin et al., 2000). Monthly variations of species richness, the Maximum number of species richness were found in August 229, and the minimum numbers of species richness were found in October 177. Reasons for decrease species richness, In particular, land use changes, exotic species invasions, nutrient enrichment, and climate change are often considered some of the most ubiquitous and influential global ecosystem changes (Virtuosic et al., 1997).In this study 9 edible insect and 7 invasive insect species were identified. The edible insect is high in number. Figure-3 shows the comparison on feeding guilt for insect species in study area, 69% of insect are herbivores, 25% of insect are carnivores, and only 6% of insect are omnivores. Maximum numbers of insects are found to be herbivores in the study area, they are the transportation system of photosynthetic energy is called primary consumers in tropic system, meaning they are the first animal to eat the producers. There are more herbivores on earth than carnivores for the same reason, only around 10% of the herbivores energy will be used by the carnivores. Perhaps our relationship with our crops

and the edible insects that live among them could best be described as symbiosis, a mutualistic interaction with an ancient history (Soloneski, 2014). Hence, the information provided by the present study gives important understanding about the Insect pests and therefore in future the proper ecofriendly method was used for management of this insect pest.

## CONCLUSION

Climate change has serious impacts on diversity, distribution, reproduction, growth, development and phenology of insect pests. Increasing global temperature, disturbed rainfall patterns, modified gaseous composition etc. can cause increase in population and activity of insect pests. The study shows that the majorities of the insect species is found in Surandai are not adopting most of available strategies to maintain insect population.

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