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Popular Article

Exploring Insect Gut Microbial Diversity: A Scientific Inquiry

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Introduction

The gut microbiome, form intricate communities that coexist in a delicate balance with their insect hosts. This symbiotic relationship, often overlooked, has far-reaching implications, influencing not only the health and behaviour of the insects themselves but also their resurgence against applied pesticides (Siddiqui et al., 2022). Gut microbiome analysis delves deep into the heart of this complexity, aiming to unravel the secrets held within the diverse communities of microorganisms residing in the insect gut. By exploring their composition, interactions, and functions, entomologists have begun to decipher the profound impact of insect gut microbial diversity on ecological processes, agricultural practices, and even human health.

Importance of Studying Insect Gut Microbiota

- I. Insects are vital components of ecosystems. Gut microbiota influence insect behaviour, which, in turn, affects plant pollination, seed dispersal, and nutrient cycling.
- II. In agriculture, certain insects are pests that damage crops. Understanding their gut microbiomes can lead to innovative pest control strategies, reducing the reliance on chemical pesticides.
- III. Insect gut microbiomes harbour a vast reservoir of enzymes and biochemical pathways. These can be harnessed for various biotechnological applications, such as biofuel production, waste degradation, and the development of novel enzymes for industrial processes (Krishnan et al., 2014).
- IV. Understanding the gut microbiomes of disease-carrying insects like mosquitoes, which transmit illnesses such as malaria and dengue fever, can yield valuable insights into disease transmission patterns and facilitate the development of strategies to disrupt these transmissions.



Methodologies Involved

The insects are left without food until they die before undergoing surface sterilization. After that, their digestive system is blended with sterile water. The resulting mixture is then diluted, and the necessary concentration is spread onto a nutrient agar medium. Bacterial and fungal colonies are recognized, sub-cultured, and purified before being progressed for research. 16S rRNA Gene Sequencing, Whole Metagenome Shotgun Sequencing, Quantitative PCR (qPCR), Metatranscriptomics, Metaproteomics, Metabolomics, 16S rRNA Gene Microarrays and Flow cytometry are the general techniques used to analyse and estimate gut microbiome.

Conclusion

From aiding in nutrient digestion and energy harvesting to influencing reproduction, development, and disease transmission, the significance of insect gut microbiomes reverberates across various fields. By deciphering the language of these microcosmic alliances, we not only enhance our understanding of insect biology but also pave the way for innovative solutions to some of humanity's most pressing challenges.

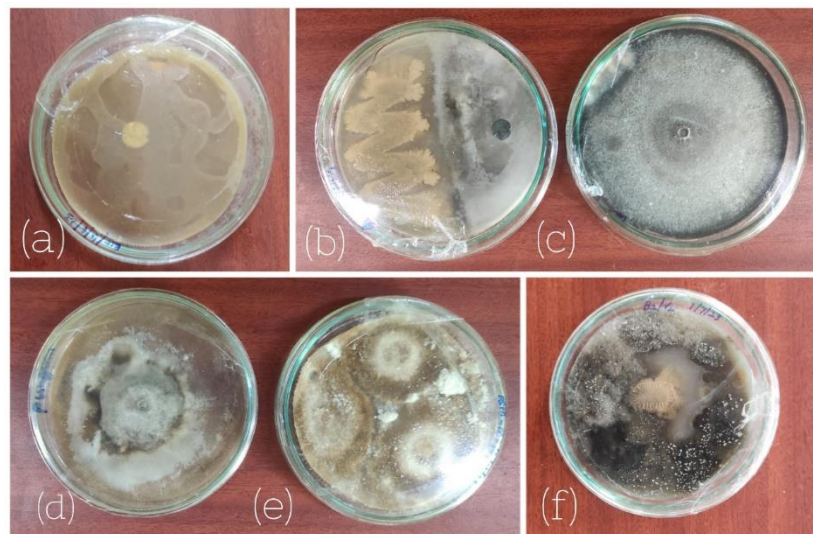


Figure: Estimation and analysis of gut microbiome population of **sugarcane internode borer** [*Chilo sacchariphagus indicus* (Bojer, 1856)], collected from Tiruvannamalai District, Tamil Nadu
(a) Unidentified bacterial culture (b & c) antagonist compatibility analysis (d & e) sub-cultured fungal colonies (f) *Aspergillus* isolated from the insect's gut

References

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