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Lac Insect Ecosystem and Associated Ants

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Lac insect *Kerria lacca* (Kerr), a phloem feeder, excrete large quantity of honeydew during its life cycle, which acts as a lure for myriad ants in the lac insect agro-ecosystems. Ants belong to the family Formicidae, super family Vespoidea, order Hymenoptera of class Insecta. Various species of insects of hemipteran orders are in mutual association with ant species, as the latter benefits in terms of gain in energy. Ants acts as protector as they reduce the impact of natural enemies on the survival of these soft bodied insects. Mutually, hemipterans may benefit from the removal of their honeydew, which reduce their mortality risk caused by fungal attack.

Keywords- Hemiptera, Ants, Muualism, Lac Insect

Introduction

A specific class of phytosuccivorous insects known as lac insects (Coccoidea: Tachardiidae) secrete resin with a variety of economic uses. Lac insects are likely to differentiate locally, generating regional and host races without sufficient physical differentiation, due to their particular biology, affinity for certain hosts, and dispersal processes. There are around 400 species of lac host plants and 101 species of lac insects known to exist; however, the Tachardiinae subfamily of insects is thought to be crucial for lac insect farming, or laksha-culture. The insects have evolved a specialized ecosystem with a multitrophic complex of flora and animals due to their large host-plant range and diverse environment. The host plants and different biotic relationships, in addition to the lac insect, are important factors in determining the amount and caliber of the yield. Being a phloem sap sucker by necessity, this insect completes its life cycle on a particular species of host plant. Rich in carbs but lacking in vital amino acids, phloem sap has an imbalanced nutritional composition. Because phloem sap lacks certain necessary nutrients, endosymbionts that meet their nutritional needs are likely to co-evolve inside the insect cell. Comprehensive comprehension is necessary for long-term lac production, as these complex biotic relationships have an impact on the amount and caliber of lac resin generated. Hemiptera: Tachardiidae) lac insect Kerria lacca (Kerr) is the primary secretor of lac, which is thought to be the sole resin derived from animals.

Interaction with Ants

Most of the insects of order homoptera secretes enormous amount of sugary substance known as honeydew. The associations between sap-feeding hemipterans and ants are classic examples of mutualism. Soft bodied liquid feeding insects reward ants with food in exchange for protection against predators and parasitoids. Herbivorous hemipterans have unique ability to access sap in plant phloem and xylem elements which results in a liquid excretory waste, commonly called honeydew, that is rich in plant-derived simple sugars, amino acids, proteins,

and other compounds (e.g., plant-derived secondary metabolites). For ants, honeydew is a reliable and abundant carbohydrate resource that has been shown to increase ant colony growth and in exchange for honeydew, ants tend hemipterans, protecting them against predators and providing the sanitary service of waste removal. Lac insect also secretes excessive amount of honeydew during its different life stages. Honeydew falling on the foliage and branches leads to the development of sooty mould and is very common and easily observed on lac insect infested host tree. Large numbers of ants on the lac settlement is also reported by many scientists. Seventeen species of ants have been reported in lac eco-system *viz*., *Camponotus compressus, C. dichrous, C. parius, Crematogaster subnuda, Lepisiota capensis, Leptogeny sdiminuta, Lophomyrmex quadrispinosus, Monomorium rubriceps, Myrmicaria brunnea, Oecophylla smaragdina, Pachycondyla tesseronoda, Paratrechina longicornis, Pheidole indica, Pheidologe tonaffinis, Tapinoma indicum, Tetraponera allaborans and T. rufonigra*. Honeydew is a key resource for ants and a driver of ant community dynamics.

Fig 1. Lac scale insects that feed crazy ants

Conclusion

Honeydew-producing insects and ants have many mutualistic associations, in which ants obtain honeydew that phytophagous insects exude and in return, the ants protect the symbionts from their natural enemies. Various ants species are found to be associated with the lac insect ecosystem.

References

1. Chen, Y. & Wang, S. & Lu, Z. & Zhang, W.(2017). Ant community dynamics in lac insect agroecosystems: Conservation benefits of a facultative association between ants and lac insects. *Tropical Ecology*. 58: 283-293.
2. Davidson, D. W. (1997). The role of resource imbalances in the evolutionary ecology of tropical arboreal ants. *Biological Journal of the Linnean society*. *61*(2): 153-181.
3. Sharma, K. K. and Kandasamy, T. (2023). Interaction Among the Multi-Trophic Lac Insect Complex of Flora and Fauna: Impact on Quantity and Quality of the Resin Secreted. *Arthropods – New Advances and Perspective*, 1-22, Intech Open.
4. Kurmi, A. and Thomas, M. (2018). Lac insect associated ants and their distribution in lac eco-systems of madhya pradesh. 7(15): 915-917.
5. Zhixing, Lu,Youqing Chen,Wei Zhang,Siming Wang,Qiao Li. (2013). Effects of facultative mutualism between ants and lac insects on the diversity of ant communities. Biodiversity Science. 21(3): 343-351.