

Ants as Engineers of Biodiversity and Ecosystem

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ABSTRACT

Ants (Hymenoptera: Formicidae) can be found almost anywhere on Earth and they always occur in vast numbers. Despite this fact, ants often go unnoticed or are considered a nuisance in and around the house. Perhaps most of us don't know about the role these tiny creatures play in maintaining our ecological balance. By aerating and mixing the soil and enhancing water infiltration they keep our environment healthy. Ants and various plants exhibit great mutual relationships. Ants not only fertilize plants with essential nutrients but sometimes function as pollinators too. While moving organic matter from place to place, ants move seeds from near the parent plant to new grounds. About 50 per cent of herbaceous plants depend upon ants to assist in their seed dispersal. Ants are important for the alteration of the physical and chemical environment through their effects on plants, microorganisms and other soil organisms. The stability, social organization, and foraging behavior of some predatory ants enable them to react quickly to increasing prey density and also make them uniquely able to protect crops from low density pests. Under some circumstances when they are the only alternative to intensive insecticide treatment or alternative practices are uneconomical and impracticable, ants are uniquely useful. All these roles lay emphasis on the ants as ecosystem engineers.

Key Words: Ants, biodiversity, ecosystem, engineers, pest, soil

I. INTRODUCTION

Ants are classified in a single family, the Formicidae, within the order Hymenoptera and are social insects. Formicidae contains 15946 valid species across the globe and in India 126 Genera in 10 subfamilies with 833 species/subspecies reported (Antweb). Ants (Hymenoptera: Formicidae) can be found almost anywhere on Earth and often go unnoticed or are considered as nuisance in and around the house.

Ants are important components of ecosystems not only because they constitute a great part of the animal biomass but also because they act as ecosystem engineers. Ecosystem engineering is one of the important factors that affects the distribution and abundance of organisms besides food availability, presence of enemies, competition, and climate. Ecosystem engineers – a term meant for key species who greatly affect other organisms – alter the distribution of large numbers of animals and plants, and modify biodiversity. They maintain the health and stability of the environment they inhabit. Ecologically, they manage resources for organisms by causing physical state changes in biotic or abiotic materials (Subedi, 2016).

II. ROLE OF ANTS IN BIODIVERSITY AND ECOSYSTEM

Ants are dominant waste manager and good soil engineers. Ants are responsible for moving more than half of food resources from the forest floor playing a significant role in keeping the ecosystem healthy and functioning. Ants collect dead organic material and take it to their nests and in the process redistribute nutrients around the ecosystem. Ants are responsible for resource removal and for scavenging along with other invertebrates. In the absence of ants, no other animals compensated to maintain levels of food removal. This suggests that without ants, dead organic material would build up and decompose more slowly, resulting in a less diverse soil environment.

Through their nesting habits, ants are agents of bioturbation, mixing soil horizons and creating avenues for water and gas exchange through the tunnels and chambers that make up their nest architecture. These activities result in soil production and altering soil chemical, physical, and biotic profiles.

Ants actually turn more soil than earthworms. Also, they are vital food for numerous reptiles and birds. They help in distributing organic matter by moving dead insects too. In furtherance of their role, some ant species support colonies of plant feeding insects, such as aphids or plant hoppers, even protecting them from predators but eat consume the sugar-rich honey dew that aphids secrete or even eat them when in need of protein.

Ants act as Ecosystem Engineers in Natural Restoration of Human Made Habitats. Seed-transporting dominant ant species (*Tetramorium caespitum*, *Lasius niger*, *Formica rufibarbis*) were studied on the plateau of abandoned ore sedimentation basin. Ants were found as pioneer and subsequent colonisers of this industrial waste deposit from the viewpoint of their functioning in plant seed dispersal. So ants play the role in primary vegetation succession (Kovar *et al.*, 2013).

Extensively, as ecosystem engineers ants facilitate the development of other organisms in their own mounds, including unique plants that otherwise would not exist, and even increase the numbers of some microorganisms. Research informs us that in the mounds of Ants the incidence of plant species is higher than on adjacent soil. Hence ants act as facilitators increasing species diversity, particularly in physically or biotically stressed systems.

Ants play a significant role in diversity and stability of ecosystem. Ants maintain microclimate and habitat which aids in biodiversity conservation. Ants are very much sensitive to environment. Hence Species composition in an area acts as an indicator of its health (Kumar *et al.*, 2014)

The stability, social organization, and foraging behavior of some predatory ants enable them to react quickly to increasing prey density and also make them uniquely able to protect crops from low density pests. The ability of ants to control pest species has been recognized since the year 300 A.D. and farmers continue to conserve and promote ant populations in agricultural systems worldwide. Ants positively impact agricultural systems by rapidly consuming large numbers of pest insects, disturbing pests during feeding and oviposition, and increasing soil quality and nutrients. Naturally occurring ant species in mango, citrus, coconut, and cotton control many pest insects. Through judicious insecticide application and changes in management practices such as tillage, and

other manipulations of vegetation and crop structure, beneficial ant populations are conserved in a variety of agro ecosystems. The first recorded example of biological control was the manipulation of ants throughout citrus orchards in Asia. Augmentation continues in citrus, and methods of ant introduction have been developed in Malaysian and Indonesian cocoa plantations, as well as to control sweet potato and banana weevils in Cuba. Ant species have been formally incorporated into other integrated pest management programs for cashew in Australia, cocoa in Papua New Guinea, and mango in Australia and Vietnam. With efforts to reduce chemical pesticide input in agricultural systems, generalist ant species must continue to control pest.

III. CONCLUSION

Ants play many ecological roles – aerating the soil, cycling nutrients, and influencing plant defense or seed dispersal, biological control. Ants are good soil engineers and play significant role in natural restoration, keeping the ecosystem healthy and functioning. Ants act as facilitators increasing species diversity, particularly in physically or biotically stressed systems. The ability of ants to control pest species can be exploited as Integrated pest management and natural control. So it is useful to reduce chemical pesticide agricultural systems. Human beings ought to learn from the role of ants in preserving Nature and try to change their ways to conserve the environment.

REFERENCES

- [1.] AntWeb. Available from <https://www.antweb.org>. Accessed 17 November 2017
- [2.] I.P.Subedi, Ants – Ecosystem Engineers, Kist Newsletter, 1, 2016, 9-10.
- [3.] P. Kovar, P. Vojtisek and I. Zentsova, Ants as Ecosystem Engineers in Natural Restoration of Human Made Habitats, *Journal of Landscape Ecology* 6(1), 2013, 18–31.
- [4.] R. Kumar, H. Bharti and G.S. Gatoria, Ants Biodiversity and its relationship to Ecosystem, In proceeding International Conference on Crop Productivity and Sustainability shaping the future: Baba Farid College, Bathinda, 2014, 90-98.