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Pharmacological potential of ants and their symbionts – a review

Surbhi Agarwal, Garima Sharma, Kavita Verma, Narayanan Latha, Vartika Mathur

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Abstract

Ants (Hymenoptera: Formicidae) play an important role in the pharmacological and food industry due to their therapeutic and nutritional properties. Being the most abundant eusocial insects in the world, ants also serve as a repository of bioactive compounds, which are utilized for their ecological interactions and defense. Ants have been used for the treatment of various diseases including asthma, cancer, arthritis, and other microbial infections in both modern and ethnic medicine. This is attributed to various compounds, such as antimicrobial peptides, biogenic amines, alkaloids, and flavonoids obtained from ant venom as well as whole-body extracts. However, most of these compounds have not been characterized till date. Ant endosymbionts are also known to contribute to some of these properties and to play a crucial role in digestion, protection from enemies, nutritional upgrading, nitrogen recycling, and reproductive manipulation of their host. Hence, they have been used in pharmaceutical, food, and cosmetic industries due to their ability to produce various bioactive compounds. In contrast, ectosymbionts specifically help in pathogen defense. However, the potential of ant symbionts in the welfare and production of therapeutic compounds is not extensively studied. This review mainly focuses on the role of ants and their symbiotic microbes as a potential source of bioactive compounds in therapeutic interventions for exploring future possibilities in drug development research.

INTRODUCTION

Eusocial insects have gained increased attention in recent decades due to their social organization, evolutionary success, and presence and abundance in tropical regions (Zientz et al., 2005; King, 2016). Amongst these, ants have been of special interest due to their ecological role in the terrestrial ecosystem and their associations with a variety of organisms such as insects, plants, and microbes (Janzen, 1969; Offenberg, 2001; Davidson et al., 2003; Zientz et al., 2005; Feldhaar et al., 2007; Russell, 2012; Barbero, 2016). Ants have also traditionally been utilized for their nutritive value. Many ant species are consumed widely in