

THE ROLE OF MITES IN BEETLE-FUNGAL INTERACTIONS

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Mites can influence the relative abundance and species composition of Ophiostomatoid fungi associated with bark beetles. Mites commonly travel on adult bark beetles and can introduce spores of fungi to beetle galleries, pupal chambers, and surrounding areas within bark. Bark beetles are often associated with multiple fungal species. Several of these beetle-fungal associations may have been established or promoted by particular mite species. In other words, mites may help maintain oligophilic associations between beetles and fungi. Mites can also have strong mutualisms with particular fungi and can be the primary mechanism by which ascospores or conidia are introduced into bark beetle-killed trees. For instance, *Tarsonemus* mites are the sole mechanism by which ascospores of *Ceratocystiopsis ranaculosus*, the mycelial fungus of *Dendroctonus frontalis*, are transported among trees. Because Ophiostomatoid fungi can be commonly transported by mites, antagonistic effects of these fungi toward bark beetles can also be pervasive and severe in bark beetle systems. For instance, populations of *D. frontalis* decline because of vectoring and propagation of *Ophiostoma minus*, an antagonistic fungus of *D. frontalis*, by *Tarsonemus* mites. Other examples of how mites influence beetle-fungal associations will be addressed, such as the role of phoretic mites in *Scolytus-Ophiostoma ulmi/novo-ulmi* and *Ophiostoma-protea* associations.