

BARK BEETLES, CONIFERS AND FUNGI: REDEFINING RELATIONSHIPS

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Scolytid bark beetles that colonize living conifers are frequently associated with specific fungi that are carried in specialized structures or on the body surface. These fungi are introduced into the tree during the attack process. The continuing association suggests that there is mutual benefit to the fitness of both beetles and fungi. Extensive research has been directed towards characterizing the interactions of beetle-fungal complexes with living host conifers and determining the advantages for maintaining the associations. The fungal species may benefit from the association with the beetles by transport to new host trees. Beetle species may benefit from the association with fungi by feeding on the fungi, by limiting the impact of potentially detrimental fungi, or by the fungi contributing to the death of the host trees through mycelial penetration of host tissue, toxin release, interactions with preformed and induced conifer defenses, or the combined action of both beetles and fungi during colonization. However, differences among systems and how species interact under different population and environmental conditions make it difficult to generalize about the importance of the separate biological components in successful host colonization. The objective of this evaluation is to describe the paradigms of beetle-fungal-host tree interactions over the last five decades and to establish the historical research context for current efforts.