Abstract

A lineage of higher termites are known for fungus farming inside their mounds. They live in an obligate mutualism with fungus of genus Termitomyces from 30 Mya. Termites depend on their cultivar fungus for the digestion of lignocellulose and Termitomyces depend on termites for growth and protection. Termitomyces is cultivated as monoculture on a structure called fungus comb which is made up of partially digested plant materials passed through the gut of termites and asexual spores of Termitomyces. Termites then feed on to the symbiotic fungus buds which grow by degrading components and using those nutrients from the comb. Pseudoxylaria has been identified as one of the main antagonists of Termitomyces. They are prevalent in termite mounds and appear to be competing with Termitomyces for resources present in fungus combs. Pseudoxylaria species are inconspicuous in healthy mounds, but are observed to be present almost always in the mound and rapidly overgrow Termitomyces in the absence of termites. The process by which termites maintain and protect Termitomyces monoculture by selectively suppressing the growth of antagonistic fungi is still not understood.

Previous studies in fungus-growing termites have shown the presence of symbiotic bacteria which can produce antifungal compounds to selectively inhibit the growth of antagonistic fungi. But, it is not proved that the termites are using these symbionts in this process of selective inhibition. This study is constituted of three parts: a culture-dependent microbiome study to isolate and identify different bacteria present in Odontotermes obesus colony, a behavioral study to observe how termites respond to externally introduced Pseudoxylaria and antifungal activity assays to check for antifungal activity exhibited by

bacteria obtained from different experiments.
Bacteria which belong to 15 genera and 5 classes were isolated and identified from different
termite samples of Odontotermes obesus colony. In the behavioral study, termites were
observed to cover externally introduced Pseudoxylaria with soil in the presence of fresh
fungus comb. Bacteria obtained from experiments were found to have no inhibitory effects
on the growth of Pseudoxylaria in antifungal activity assays. But, these experiment provide
an example of biologically relevant situations in which potential defensive symbiotic
bacteria are presumably abundant and relatively easy to find.