

Disease-free monoculture farming by fungus-growing termites.

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Abstract

Fungus-growing termites engage in an obligate mutualistic relationship with *Termitomyces* fungi, which they maintain in monocultures on specialised fungus comb structures, without apparent problems with infectious diseases. While other fungi have been reported in the symbiosis, detailed comb fungal community analyses have been lacking. Here we use culture-dependent and -independent methods to characterise fungus comb mycobiotas from three fungus-growing termite species (two genera). Internal Transcribed Spacer (ITS) gene analyses using 454 pyrosequencing and Illumina MiSeq showed that non-*Termitomyces* fungi were essentially absent in fungus combs, and that *Termitomyces* fungal crops are maintained in monocultures as heterokaryons with two or three abundant ITS variants in a single fungal strain. To explore whether the essential absence of other fungi within fungus combs is potentially due to the production of antifungal

metabolites by Termitomyces or comb bacteria, we performed in vitro assays and found that both Termitomyces and chemical extracts of fungus comb material can inhibit potential fungal antagonists. Chemical analyses of fungus comb material point to a highly complex metabolome, including compounds with the potential to play roles in mediating these contaminant-free farming conditions in the termite symbiosis.

Involved units

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