

Abstract

Mycophagy should not be considered as a single and homogeneous category of nutritional biology due to the specific symbiotic chitinolytic bacteria associated with mites and fungi. To test interaction among mites, fungi, and chitinolytic bacteria, experiments were conducted on the model species *Tyrophagus putrescentiae* (Schrank). *Mucor* sp, *Alternaria alternata*, *Penicillium claviforme*, *P. griseofulvum*, and *Verticillium* sp. were plated onto malt agar and offered to *T. putrescentiae* in the laboratory. Mites were evaluated utilizing microanatomical examination based on histology, excrement analysis using fluorescence microscopy, bacterial plating, impact of mite homogenate on fungi in Petri dishes, reproduction of mites feeding upon each fungus, and isolation of associated bacteria inside mites. There were clear differences regarding the digested spores of different fungi passing through the gut and subsequently in the feces. Abundances of bacterial cells in excrement also corresponded to the fungi offered. The extracts from mites had chitinolytic activity, and the plated bacteria are known to produce exochitinases. The various feeding patterns observed were caused by differences in the cell wall structures of the tested fungi. The study illustrates that mycophagy in saprophagous mites does not consist of a single pattern, but rather that it can be classified into several sub-patterns depending upon the digested fungal species and its parts. The results point to a nearly symbiotic relationship between chitinolytic bacteria and digested fungi in mycophagous microarthropods.