

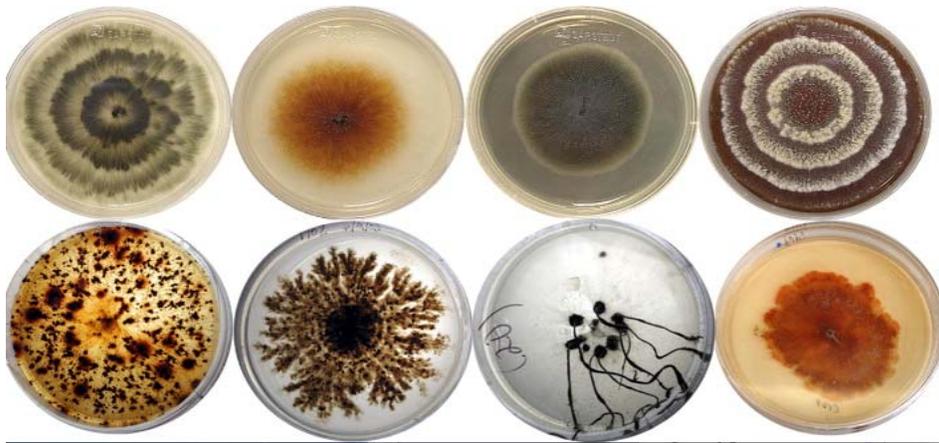
Fungi Farmers Feed Millions

By Joel Kershner

As we learned from Leonora Bittleson's fascinating talk on Feb. 6, 2012, untold millions of years ago tropical leaf-cutter ants perfected the cultivation of fungi to feed their young. While her talk, *Leaf-cutting Ants and Endophytes: Two fungal Mutualisms Meet*, was based on careful scientific studies and field observations, just about every fact and visual image in Leonora's presentation was a source of wonder and curiosity. Her research and our questions begged for further exploration.

To start a new colony, the ant queen leaves her nest of origin, and "...prepares by packing some of that nest's fungal hyphae into a pocket in...her mouth"¹. She digs a chamber in the earth, spits the fungus packet into the chamber and begins the painstaking steps to cultivate the fungus and laying eggs. The ants that hatch develop into at least six castes, each with their own role.

As with any agricultural enterprise, there are many species of microorganisms, which could either benefit or threaten the farmer's crop. The ants have at least three strategies for inhibiting the growth of fungal species other than the one they are cultivating. Leonora's research shows that the forager ants tend to cut leaves that contain lesser amounts of the dozen or more species of endophytic fungi that grow within the leaf structure. These endophytic fungi could contaminate the single species of fungus that each colony of ants cultivates on the leaves they bring back to the nest.



Leonora Bittleson's team cultivated these endophytic species in the lab.

The very smallest workers are responsible for a second strategy for maintaining the cultivated fungi free of contaminants. They carry bits of fungal material to feed the colony's young, and they also weed the garden of alien mold species.

The ants have yet a third amazing strategy in their armament to fight microbial parasites that could destroy the crop and the nest. Along with a fungal starter pellet, the queen

carries a bacteria species that produces an antibiotic to fight the parasitic fungus. In fact, studies have found that the ants in a single nest may carry up to seven strains of the antibiotic-producing bacteria on their bodies, evidence of a continual race to overcome evolving resistance by the parasitic fungi.

¹ from “First Farmers” Ants, Plants & Fungi” by Susan Goldhor, to be published in a future BMC Bulletin.