

Termitomyces, A unique mushroom of the Rain Forests

During the damp days following the monsoon showers, one can often see wild mushrooms spring up in the undergrowth of the forested valleys where we live. Locally, people share a great interest in these mushrooms as they provide nutritious and delicious source of food, and are also coveted for their medicinal value.

A few weeks ago, hidden within the leaf litter, we found little white balls moving around on the forest floor. Upon a closer look, these were being brought to the surface through channels in the soil by termites. One by one, the termites brought these tiny balls, which we later realized were compact mycelium balls, and pushed them to the surface. Overnight, these grew from a few to several



Termites bring mycelial nodules 'mycotetes' to the surface.



Mushrooms emerge from the mycelial nodules.



Mycotetes grow in numbers overnight and keep growing as termites continue to bring them to the surface.



Closeup of the mushrooms.

hundreds, and then within the next 24 hours, there were patches all over the ground. The next day, most of these balls sent a stem up and each stem opened into a mushroom umbrella! We had discovered what is known as *Termitomyces microcarpa*, a small wonderfully tasty mushroom, which is intrinsically linked to termite mounds.

Termitomyces is a mushroom farmed by termites. It belongs to the family Lyophyllaceae, and occurs both in Asia and Africa. The termites, called *Macrotermes*, belonging to the subfamily Macrotermitinae are characterized by their symbiosis with *Termitomyces*. The fungi are unique in being able to grow only in symbiotic association with termites which cultivate them on semi- digested organic matter that they bring back to their nests from feeding on decaying trees. On

their own, the termites lack the enzymes to completely digest the plant matter. The fungi, being saprophytic, secrete enzymes which degrade cellulose and lignin, components of the dried or decaying plant matter on which termites live. Fungal-decomposition of the organic matter results in a food rich in nitrogen and phosphorus, both essential for the well-being of the termites.

Termites farm the mushrooms on terraces inside their 'termite hills' which is visible as a mound above ground and can reach to depths of 1–3 m. The tunneling can expand over vast areas, and the mushroom terraces or 'combs' fill these spaces as the colony grows. The mycelium makes little nodules called 'mycotetes', which are enriched in minerals and nutrients, and these are what the termites feed on. Finally, with the onset of the rains and building up of humidity, the mycelial nodules are carried up one at a time by the termites to the surface. These grow into mushrooms overnight, and the fungus is able spread across wider areas through its spores. It is the mutualism that enables the survival, evolution and spread of both, the termites and the mushrooms.

Over twenty edible species of *Termitomyces* have been recorded across Asia and Africa and vary in size from the smallest caps of 2 cm found in *T. microcarpa* to those with the largest caps measuring 1

m in *T. titanicus*. These are collected and sold for their nutritional and medicinal value. *Termitomyces macrocarpa* has also been found to be a source of ergostanes which show promising cytotoxicity against cancer cell lines. Together, the termites and fungi have created a powerful example of mutualistic survival.

This observation was at the Rainforest Retreat in Coorg. The mushrooms are quite well known locally and called 'Nuchhi kumm'.

Anurag Goel¹ & Sujata Goel²

^{1&2} Rainforest Retreat/ Mojo Plantation, PO Box 101, Madikeri 571201, Kodagu, Karnataka
Emails: ¹annugoel@gmail.com, ²sujatamaya@gmail.com (corresponding author)

Citation: Goel, A. & S. Goel (2021). *Termitomyces*, A unique mushroom of the Rain Forests. *Fungus #3*, In: *Zoo's Print* 36(6): 01–03.