Research on fungi leads to new directions

Some people view fungi as a nuisance. Many, however, see great potential in these unique organisms.

The Pacific Northwest National Laboratory's Marine Sciences Laboratory in Sequim, Wash., possesses a rich history of fungi-related research and a collection of more than 200 strains of fungal species, some of which have been developed to perform environmental remediation and other tasks.

"We continue to explore the use of fungi for remediation, such as cleaning up contaminated sites, but we also are looking at more diverse research pathways," explained senior research scientist Susan Thomas. "We have been moving toward the study of marine and aquatic fungi for applications related to marine sediment. We also are interested in learning how we might harvest natural products from marine fungi and how our work could apply to the detection of biological pathogens and other contaminants in marine systems with respect to environmental and coastal security issues."

Scientist Susan Thomas (left) and colleagues at the Marine Sciences Laboratory are enthusiastic about fungi and its potential to supply innovative solutions to agriculture and many other fields.

Critical to new and existing areas of fungal research is MSL's extensive library of fungal species and scientists' experience with a variety of applications. Recently, for example, Thomas and colleague Meg Pinza, also a senior research scientist, completed a study on using fungi to degrade livestock manure and temper the waste-related odors commonly associated with dairy farms and feedlots. The work was prompted by colleagues at Battelle and PNNL, who have been perfecting a Battelle-developed technology for cleaning manure treatment ponds ("New PNNL-developed technology treats dairy wastes, odors," *Hanford Reach,* Sept. 10, 2001).

Thomas and Pinza were tasked with finding a way to address the troublesome "cap" of manure, straw, sawdust and other materials that tends to form on treatment ponds and clog the cleaning technology. Researchers combined several fungal strains, which were applied via liquid mist to cap material obtained from a farm in northwestern Washington state. The treatment broke down the cap's components to reduce volume, remove excess nutrients such as nitrogen and phosphorus, and at the same time destroy fecal coliform bacteria and reduce odors.

"This treatment process is natural, does not harm the environment and uses fungal strains that are native to the area, which is important. We would not introduce non-native fungi," Thomas emphasized.

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"In addition to degrading the manure, we were asked if the fungi could produce a beneficial byproduct — mushrooms — that could be used as livestock feed. We selected a couple of strains that yield clean, nutritious fruiting bodies and this is looking like a possibility," Thomas said.

Thomas and Pinza said farmers are looking to innovative technologies to solve emerging issues associated with animal waste and are very interested in the approach developed at MSL. "There are opportunities to use this technology in buffer zones near agricultural areas, around manure ponds and livestock enclosures," Pinza said.

In addition to waste treatment, the researchers believe significant opportunities exist for using fungi to clean up sediment along rivers and in upland areas. "A study we conducted involving remediation of highly contaminated sediment along the Willamette River near Portland was very successful," Pinza noted. ■