

Montana State professor hopes to help high elevation pines grow

July 17 2009

Thread-like fungi that grow in soils at high elevations may play an important role in restoring whitebark and limber pine forests in Canada. Montana State University professor Cathy Cripps is looking for ways to use fungi to help pine seedlings get a strong start.

Cripps' is working with resource managers and visitor relations staff from Waterton Lakes National Park (WLNP). She is part of a project that aims to restore fire to the national park, reduce the impact of noxious weeds and restore disturbed sites to native vegetation, including whitebark and limber pine. The pines have declined from 40 to 60 percent across their range, and when the trees die, the [fungi](#) associated with them also die.

"Cathy's research on fungi and their importance to these pines at various life stages has led us to believe that we may no longer have the necessary fungi in our soils because of the long decline of both pines," said Cyndi Smith, conservation biologist at WLNP.

Both pines are dying from a combination of an introduced disease (white pine blister rust), mountain pine beetle, fire suppression and a warmer climate.

Cripps' role in the project is to identify native mycorrhizal fungi--fungi associated with plant roots. Specifically, she is looking for mycorrhizal fungi that associate with whitebark and limber pines. The fungi are important in the establishment and survival of the trees.

"Mycorrhizae make the trees healthier and more able to resist disease, insects and drought," said Cripps.

Mycorrhizal fungi grow on the roots of 90 percent of plants, according to Cripps.

"Mycorrhizae extend the plants' root system and can get into places in the soil that the root system can't access," said Cripps.

Mycorrhizae take in, and share with the plant, nutrients such as phosphorous and nitrogen. The fungi can improve drought tolerance by delivering additional water to the trees. The trees leak sugars produced during photosynthesis that feed the fungus.

Finding the fungi isn't easy. While some fungi produce mushrooms, many of the species Cripps hunts live entirely underground. She looks for small cracks in the soil where the fungus may have pushed the soil up, or places where small mammals have dug, attracted by the scent of the fungi's underground fruiting bodies.

Cripps hikes in dry forests a few days after a rain. Since the fungi she is interested in associate with high elevation trees, she must wait until mid-to-late summer when the snow has melted from the mountains.

"It's painstaking work," said Cripps. "There is a lot of walking and searching for almost unnoticeable signs."

Cripps has surveyed mycorrhizae from Yellowstone through Waterton Lakes National Park and into Banff, Canada, and has found related fungi associated with these pines throughout the northern Rockies. These mycorrhizal fungi are specific to five-needled pines, including whitebark and limber pines.

When she finds the fungi, she collects them in small plastic boxes to take back to her lab at MSU. Cripps grows new fungi from the ones she collected and adds it to the soil of whitebark pine seedlings in the greenhouse.

The seedlings with fungi in their soil become greener and more robust than the seedlings without the fungi, according to Cripps' unpublished results.

The next step is to determine which fungi species are most effective for larger scale use.

"It's a slow process because these seedlings grow so slowly," said Cripps.

Cripps doesn't have the luxury of taking her time on this project, regardless of the trees' growth rate.

Cripps, along with other researchers and land managers involved in the Waterton Lakes project hope to add fungi from Cripps lab to 1,500 whitebark pines seedlings they will plant this fall over 7 to 10 acres.

"All of the sudden the interest just blossomed with this grant," said Cripps. "It will be a race to the fall."

Source: Montana State University ([news](#) : [web](#))

Citation: Montana State professor hopes to help high elevation pines grow (2009, July 17)
retrieved 26 April 2024 from
<https://phys.org/news/2009-07-montana-state-professor-high-elevation.html>

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