

 UI Extension Forestry Information Series

## The Case of the Deformed Trees

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Insect and disease diagnostics are sometimes very similar to a good murder mystery. Someone calls you on the phone to report a death. You gather as much information as you can about the events leading to the reported incident, about the surroundings, and any suspects. On occasion, your information leads to a dead end and, after months of investigation, you are left with one of America's unsolved mysteries.

Over the years, we have had our share of unsolved tree-problem mysteries, many of which we still have not found the answer to. But in *The Case of the Deformed Trees*, a particular pattern began to emerge, leading us to believe that the deformation and death of conifers across Idaho were related. In 1994, a UI county faculty member in south Idaho called with a problem from a local nursery. Their Colorado blue spruce had swollen terminal buds that had died and looked like "asparagus tips". Another landowner across the state reported spruce with "bent tips and needles yellowing". That's easy, we thought, it's needle cast or a watering problem, but the trees didn't respond to treatment. In 1995, the same nursery called with a problem on pine – the candles would elongate in the spring and then turn brown. They became resin coated and crooked, with some pith browning. But there were no entry and exit holes or evidence of larvae, challenging our diagnosis of European shoot moth. Over the next few years, similar reports of swelling, distortion, and medusa-like growth continued to come in from all over the state. In the fall of 1999, the same symptoms were reported in several locations on Douglas fir in Whitman County, Washington. Once again, information was gathered and samples taken and examined. All of these cases defied a solid diagnosis – we came up with physiological stress, winter kill, dormancy requirements not being

met, pesticide residuals, misapplication, or drift, mite damage – but were just throwing out our best educated guess. And then one day, the phone rang...

The latest victims were Austrian pine. This time I had our new forest pathologist, George Newcombe come out to the site with me. Upon investigation, we observed signs of gross swelling and distortion of leaders. We took samples and collected information about planting, maintenance, pesticide application and use, and the surrounding environment. Then it was back to the lab with George and Steve Cook, the new UI Forest Entomologist, to study the samples. George quickly ruled out any fungal pathogens. Steve, however, had struck entomological gold. He put the sample we gave him under his 40x powered microscope, a piece of equipment we did not previously have, and lo and behold, there they were – *Eriophyid* mites.

*Eriophyid* mites are part of a group of insects that are mostly unknown and undescribed. They are very small (their size is measured in micrometers) and are undetectable with a conventional hand-lens or common dissecting microscope. These torpedo-shaped, slow moving insects dive in and out of leaf stomata to feed on interior leaf tissue. On conifers, their damage is expressed by chlorotic, distorted, or dwarfed needles, by rosetted bud/needle clusters similar to witches'-brooms, by galls, and by partial defoliation of old as well as current season's needles. They are found on the buds and foliage of all North American conifer species. Because these mites are not visible without powerful magnification, they often go undetected until extensive damage has occurred.

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On pine, *Eriophyid* mites initially congregate between the needles (where Steve found them), but as population increase, they will cover the entire base of the needle under the sheath. Eventually, they destroy the entire base of the needle through feeding. Little is described, or even known, of *Eriophyid* mites that parasitize other species of conifers such as Colorado blue spruce and Douglas fir, although mention of one species of *Eriophyid* mite is reported on Douglas fir in coastal California and Oregon. A newsletter from Minnesota reported the same problem on Black Hills spruce, white spruce, and Colorado blue spruce. Elsewhere in the continental U.S., they have been reported on Douglas fir, most species of true fir, hemlock, juniper, pine, and spruce.

I have suspected *Eriophyid* mites through the years, but was never able to find even one under my scope (it's not even close to 40x power). Now that we have one confirmed diagnosis – which has led us to reopen the *Case of the Deformed Trees* – we are in the process of pulling records of unidentified problems

from the past on trees across the state of Idaho. Landowners and county faculty will be contacted and asked to collect samples this summer. We are fairly confident that we will find *Eriophyid* mites on several of our unsolved mysteries.

The good news is, we have made a positive identification. The bad news is, standard treatments for mites, which is dormant oil application before bud break in the spring, doesn't seem to be a good control method. A systemic insecticide might work, but there are no products registered for use on conifers for this particular insect. A systemic insecticide trial is being developed by UI researchers and private industry to look for a new product that may control these mites on conifers.

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This information first appeared in Woodland NOTES, Vol. 12, No. 1.

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