Study Finds Oldest Trees Grow Slowest - Even as Youngsters

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(PhysOrg.com) -- A newly published study has found that the oldest trees in the forest also grow the slowest - and they likely aren't the prettiest.

These ancient trees, whether they are evergreens or hardwoods, often are stunted and may be growing in a harsh micro-climate, such as in poor soil, in the shade of larger neighbors, or on a slope. Slow-growing trees "co-mingle" with faster-growing trees, the study found, and why the trees grow at different rates likely is a combination of genetics and environment.

"It has always been suspected but never proven that within a species, old trees grow slower," said Bryan Black, an assistant professor of forestry at Oregon State University, who works out of OSU's Hatfield Marine Science Center in Newport, Ore. "The oldest trees, though, are not necessarily the biggest. Even though they have longer lifespans, the long-lived trees grow so slowly that they rarely get as big as their faster-growing, shorter-lived counterparts.

"That creates implications for management because this slow growth is apparent within the first 50 years," Black added. "If the goal for a certain forest is timber production, resource managers may want to develop strategies to enhance fast-growing trees. The flip side would be logical if the goal was to produce an old-growth forest."

Results of the meta-analysis study were published in the recent issue of

the journal *Ecoscience*.

Black, who often works with marine scientists, said the study was inspired by his collaboration with fisheries research, where slow growth among long-lived individuals has long been accepted. A dendrochronologist, he began his research looking at how tree rings might contain clues to climate change and has studied similar age rings in the shells of clams and other bivalves and in the otoliths (ear bones) of long-lived fish.

In his analysis of old trees, Black combed through tree-ring studies looking at Douglas-fir, white oak, ponderosa pine and eastern hemlock and found the same held true regardless of species or location - old trees grow more slowly, and it begins early in their lives.

“Faster growing trees may put all of their energy into growth and burn out before they can achieve really old age,” he said. “Slow-growing trees may invest a lot in producing strong wood and defense mechanisms against insects and disease and never rise above the forest canopy.”

Why these different trees co-mingle is something of a mystery, Black admits. It may be a “tortoise-and-hare” situation.

Rapidly growing trees may occupy space more quickly, reach sexual maturity earlier, and are more prone to frequent, catastrophic disturbances, including flood, fire and windstorms, Black said. They also die at a younger age. Meanwhile, the slower growing trees channel their energy into structural support and defense compounds, don’t burn out from reproducing, and slowly-but-surely outpace their mercurial cousins.

These Methuselah-like trees are, in a word, “rugged,” Black said.

“These long-lived trees grow slowly - but not too slow,” Black said. “It

seems to be some kind of balance that the trees grow at just the right pace for their environment and the conditions stop just short of causing them to die. The lesson is that there may be even greater diversity to our forests than we had realized.

“Moreover, this study adds to the growing body of research that links slow growth with longevity,” Black added. “It’s certainly true of animal species and apparently it is a phenomenon also shared by trees.”

Provided by Oregon State University