NATURAL RESOURCE MANAGEMENT

Tree rings help research of droughts

By **JASON JENKINS**

Key Points

- MU forestry specialists are gathering and building a tree-ring database.
- Ancient white oak tree rings and sub-fossil logs are used in the study.
- Tree-ring patterns show droughts occur on a regular 18.6-year cycle.

WHEN putting last summer's drought in perspective, Rich Guyette doesn't think back to the severe drought of 1988 or even the Dust Bowl era. Instead, the University of Missouri forestry professor recounts a severe drought that held north Missouri in its clutches from 1548 to 1558, a story forever chronicled in the rings of ancient trees.

For the past four years, Guyette and Mike Stambaugh, MU senior research specialist, have combed streams and rivers of northern Missouri and southern Iowa searching for additional chapters to the tree-ring story.

"Thousands of ancient trees exist in the streams that can be used for climate and drought research," Guyette says. "We've found logs that date back more than 14,000 years."

Like a giant jigsaw puzzle across the millennia, Guyette and Stambaugh have pieced together the American Long Oak Chronology from more than 200 subfossil logs, mostly bur and swamp white oak trees. The researchers' tree-ring database chronicles more than 1,000 consecutive years, from 912 to 2004.

"As a stream meanders, it undercuts trees growing along the banks," Stambaugh explains. "When a tree eventually falls in, it gets buried in the sediment and preserved. Then, when the stream meanders back hundreds or thousands of years later, the preserved log is uncovered."

The oaks get preserved because they are big and heavy, and sink rather than float, Guyette says. "They don't wash out of the system and are buried in a low-oxygen environment."

Piecing a log's tree-ring history into the chronology is a three-step dating process, Guyette says. "First, we use the log's density to determine its age within a few thousand years. Then, we carbon-date the log to get within a few hundred years." From there, the researchers use a cross-dating technique that synchronizes distinct tree-ring features against other logs of known age. "This makes a lot of little chronologies that we eventually tie together," Stambaugh says.

Since completing the 1,000-plus-year chronology late last year, Guyette and Stambaugh have begun analyzing the data. They've found the tree-ring patterns show that Midwest droughts have occurred on a regular 18.6-year cycle. The cycle mirrors the lunar nodal cycle, which is based on the moon's position relative to the Earth.

Unsolved mystery

How exactly this celestial cycle affects climate is still a mystery, according to Stambaugh.

"The lunar nodal cycle is expected to peak in April 2006," he says. "This ancient tree-ring evidence reveals that as we approach the height of the lunar nodal cycle, droughts are more probable."

The importance of the chronology lies in its ability to provide information about past climate variability and timing of specific climatic events.

"There is evidence in the record of some correlation with El Niño events," he says. "This record of plant growth from one of the most productive agricultural regions of the planet gives us an opportunity to understand how oscillations like El Niño behaved during periods of low human atmospheric inputs over long timescales."

Guyette says they plan to continue extending the chronology further back in time as additional tree-ring samples synchronize. While both researchers are hesitant to make any predictions, they say this year's drought does fit the pattern.

"A 1,000-year record of drought occurring on an 18.6-year cycle — it's hard to argue that it won't continue in the future," Guyette says.

Jenkins, Columbia, is a MU Extension senior information specialist.

USDA presents energy strategy to aid producers

IN response to requests from producers, USDA has unveiled a comprehensive energy strategy to help farmers and ranchers mitigate the impact of high energy costs and develop long-term solutions. Agriculture Secretary Mike Johanns has announced the formation of the USDA Energy Council. USDA is interested in creating risk-management tools that help producers manage the adverse impacts of high energy costs.

Another short-term tool is the newly revised online energy calculator. USDA's Natural Resources Conservation Service developed the Energy Estimator to calculate the diesel fuel usage and costs associated with various tillage practices.

USDA is also intensifying efforts to support the development, production and use of renewable fuels.