

Walnut trees may not be able to withstand climate change

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Douglass Jacobs is concerned that warmer, drier conditions and extreme weather conditions predicted in climate change scenarios could have adverse effects on walnut trees. Credit: Purdue Agricultural Communication photo/Tom Campbell

Warmer, drier summers and extreme weather events considered possible as the climate changes would be especially troublesome - possibly fatal - for walnut trees, according to research at Purdue University.

Over five years, Douglass Jacobs, a professor of forestry and natural resources, and Martin-Michel Gauthier, a former doctoral student under Jacobs who is now a research scientist in the Ministry of Natural Resources in Quebec, studied the physiology of walnut [trees](#), which are economically significant in Indiana for their lumber and veneer, and in other areas for their nuts. They found that the trees are especially sensitive to particular climates.

"Walnut is really restricted to sites not too wet or dry. It has an extremely narrow range," said Jacobs, whose findings were published in the December issue of *Annals of Forest Science*. "We suspect and predict that climate change is going to have a real impact on walnuts. We may see some type of decline of the species."

Specifically, walnuts would have difficulty tolerating [droughts](#) that could be associated with a [changing climate](#).

"Changes in moisture could restrict its ability to survive without irrigation," Jacobs said. "Almost all climate change models predict that climates will become drier."

Walnuts are also sensitive to cold, so much so that they have developed a [defense mechanism](#) against late frosts. Jacobs said walnut trees don't begin sprouting leaves until almost a month after other trees in the spring.

That defense mechanism could be compromised by [extreme weather events](#) associated with [climate change scenarios](#). Late spring frosts after walnuts have developed leaves could kill trees.

"That, on top of the increase in temperatures, would be a problem for walnut," Gauthier said. "The trees would basically shut down."

In California, more than 500,000 tons of walnuts were sold for more than \$1 billion in 2010, according to the U.S. Department of Agriculture.

In Indiana, black walnuts are prized for their wood. Charles Michler, project leader of Purdue's Hardwood Tree Improvement and Regeneration Center, said walnuts accounted for as much as 15 percent of the logs sold in Indiana at a value of about \$11 million.

"Walnut is probably the most important species in the hardwood products industry today," Michler said.

The center has a walnut breeding program that is attempting to identify trees that can be used in different climates, he said.

One goal is to find [walnuts](#) that may be able to stand up to the heat or cold stresses that trees could be subject to in a changing climate. The center is looking at seeds that come from mature trees to see if the seeds have attained defense mechanisms against changes already seen in climate.

"That could be the strategy that trees have," Michler said. "The trees that are mature now may be affected by [climate change](#), but the seeds they produce may be adapting through genetic changes."

More information: Abstract on the research in this release is available at: www.purdue.edu/newsroom/research/2011-11-walnut-trees-climate.html

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