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San Francisco Chronicle

**Global warming could hurt wine
Scientists fear that rising temperatures will
harm the wine industry in Napa, Sonoma and
Santa Barbara counties ... and that by the end
of the century, the best growing lands in the
state's \$2.9 billion industry will be unsuitable
for the finest wines**

Jane Kay, Chronicle Environment Writer

Tuesday, July 11, 2006

Americans may have another reason to worry about global warming: Apart from the rising seas and disappearing polar bears, climate change could also wipe out premium wine grape growing in Napa, Sonoma and Santa Barbara counties by the end of the century, according to a new study out today.



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An increase in the number of very hot days during the growing seasons would make California's richest wine-producing regions unsuitable for the finest grapes, under the scenario published in Proceedings of the National Academy of Sciences.

Yet some internationally known climate experts warn that models aren't yet good enough to predict effects on future agriculture and at best can only suggest possible outcomes.

Despite those cautionary comments, the study's authors say predictions of losing the best growing lands for the state's \$2.9 billion wine industry bring home the importance of climate in farm production.

"One big lesson is that the daily temperature changes are very important" and not just the change in average temperatures, said Noah Diffenbaugh, assistant professor of earth and atmospheric sciences at Purdue University and a study author.

He and colleagues are starting to look at a number of other crops such as soy beans, corn and timber, as well as agricultural pests, he said.

The paper concludes that production in the Napa and Sonoma valleys and Santa Barbara County would essentially be

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eliminated by the late 21st century. The only areas in California that would remain suitable are the narrow coastal bands and the Sierra Nevada, according to the analysis.

The United States could lose up to 81 percent of its premium wine grape growing acreage by 2100, with the greatest losses on the West Coast and the Southwest, the study says.

The researchers, including from Utah State and Southern Oregon universities, picked premium vineyards to study because of centuries of records on the relationship of climate and wine grapes.

"We know that climate change has affected wine production in the past," Diffenbaugh said. "If you go back to the medieval warm period, there were vineyards in south England. Then the Little Ice Age that began in the mid-16th century eliminated those vineyards."

Other studies on the cultivation of premium grapes have predicted a shift northward in Europe and to southern and coastal areas in Australia.

In the principal wine grape growing regions of California, Oregon and Washington, growing season temperatures already have warmed by more than 1 1/2 degrees Fahrenheit between 1948 and 2002, driven mostly by changes in minimum temperatures.

Andy Beckstoffer, one of the largest grape growers in Northern California with holdings in Napa Valley and Lake and Mendocino counties, said he already thinks "global warming is a big problem worldwide" even though "some people don't seem to realize it."

"It's up to the people at Purdue University and not up to a grape grower in Napa" to make climate predictions, he said. But despite global warming, he and others already have devised new technology for growing better grapes in response to variations in seasonal heat and other conditions.

In the old days, the growers created "California sprawl," a canopy of vines on trellises that would lead to a sauna-like effect beneath that produced unwanted fungus. The growers switched to growing vines vertically, but the sun damaged the exposed grapes. Now growers provide enough of a canopy to protect the grapes from sun.

"We're growing better quality grapes today whether global warming is happening or not. But that doesn't say we shouldn't be vigilant."

Climate is crucial to grapes, he said. For example, Napa Valley growers need the fog and the up to 30-degree drop in temperatures from day to night to grow their celebrated Cabernet Sauvignon, Pinot Noir, and Merlot grapes.

The study's authors -- including Filippo Giorgi, a climate scientist in the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy -- are part of a small group of scientists using a fine-scale high-resolution model that examines grids of 25 kilometers for the full continental United States. The global model most widely used now employs 300-kilometer grids.

The 25-kilometer model also captures the influence of topography, soil moisture, changes in evaporative cooling and

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the effect of more heat absorption in soil as a result of snow melt in the Rocky Mountain chain. It also considers the human-caused buildup of carbon dioxide, which hastens global warming.

Scientists working with the United Nations Intergovernmental Panel on Climate Change, or IPCC, agree on projections for melting of Arctic glaciers, rising sea levels and increases in atmospheric and ocean temperatures, but most of them don't yet accept predictions of future effects on crops.

"Models are not good enough for this purpose in my view," said Kevin E. Trenberth, head of the climate analysis section at the National Center for Atmospheric Research in Boulder, Colo., and a coordinating lead author of the upcoming IPCC assessment, which weights all the new scientific work done on global warming. The assessment is expected in 2007.

Scientists think the signals of global warming have emerged over the past 30 years, and have recorded a warming in the West, but not so much warming in the East and hardly any in the Southeast, he said. Land east of the Rockies has become wetter and cloudier and storm patterns have changed, bringing heavier rainfall and affecting hurricanes. "Models do not predict what has happened to date yet, and I imagine that such changes are important for grapes," Trenberth said.

University of Alabama atmospheric science Professor John Christy, lead author of a new study on calculating Central California's temperature trends published in the American Meteorological Society's Journal of Climate, said that using a model to reproduce past observations weren't successful for the years 1910-2003.

"I would not base economic decisions on the output of regional predictions from these models. As Alabama's state climatologist, I've watched agriculture closely during these past 20 years, and I've seen how farmers have applied clever adaptations to overcome many negative impacts on their produce, including those from climate variations," Christy said.

In defense of the study, Diffenbaugh said the model that the authors used did pick up past temperatures from 1961 through 1989, the heat wave of 1995 and Midwest flooding in 1993.

At Lawrence Livermore National Laboratory, scientists are trying to understand why the regional models don't always agree with the past climate observations, said David Lobell, a researcher who studies climate change and its impacts on agriculture.

"Once we understand that, we can have more confidence in our future projections," Lobell said.

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