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Climate change could give Napa sour grapes

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By any measure, California wines rank among the best in the world. But a 2-degree rise in temperature could make Napa Valley chardonnay a thing of the past.

Warmer grape-growing regions such as the Livermore Valley could be knocked out of the premium wine game entirely.

"It's clear that there's the potential for really substantial problems, and almost certainly going to be some change," said John Williams, owner and winemaker at Frog's Leap Winery in Napa Valley.

Although grapes may feel the heat first, they won't be alone. Many of the state's signature crops -- avocados, oranges, almonds -- will face serious declines in yield by mid-century, according to computer models that project climate changes.

Agriculture is the industry whose fate is most closely linked to climate, and California is by far the biggest agricultural producer in the country.

The state grows more than half the nation's fruits, nuts and vegetables and is virtually the sole source of more than a dozen crops, including nectarines, raisins, artichokes and olives. Texas is a distant second, bringing in less than half the $26 billion grossed by California farmers and ranchers.

Other states may escape relatively unscathed, and some studies show that the uptick in temperature and longer growing season predicted by climate models could actually be a boon to agriculture in the northernmost states.

But California's climate already is close to ideal for many of the fruits and vegetables it is famous for, and even the most optimistic climate predictions show California on the losing end. "At the current crop mix that we have, we're pretty much at the optimum, so changing that would push us over the peak of that curve," said economist Olivier Deschjnes of the University of California, Santa Barbara.

In a forthcoming study in the American Economic Review, Deschjnes and Michael Greenstone of the Massachusetts Institute of Technology estimate that global warming will result in a 4 percent, or $1.3 billion, increase in agricultural profits for the United States by the end of the century. But California may see an annual loss of 15 percent, or $750 million. One of the biggest reasons for this is the state's precarious water situation.

Some climate models project the state will get more rain during the growing season, but big problems will come from a projected decrease of 30 to 90 percent in the Sierra snowpack by 2100. The snowpack acts as the state's biggest reservoir, storing about 40 percent of the water we use and releasing it slowly as the snow melts in the spring. About 90 percent of California's crops are irrigated. They depend on the melting snow in the summer and fall, when irrigation demand is high and reserves from rainwater are low.

If that pattern changes, agriculture -- which uses 80 percent of the state's supply of fresh water -- could take a big hit.

"I cannot emphasize enough how critical a factor that is for California's agriculture," said ecologist Chris Field of the Carnegie Institution at Stanford University. "It doesn't matter how fast or slow a plant can potentially grow. In California, if you don't give it sufficient irrigation water, it's not viable as a crop."

To make matters worse, the bulk of the state's agricultural profits come from perennial plants that live 30 years or more; it would not be easy or cheap to swap them for more heat- or drought- resistant crops, or to move growing areas to cooler locations.

Some California crops already are feeling the heat.

Len Del Chiaro says the biggest threat to his 70 acres of cherry trees in Brentwood is a decline in "chill hours," or hours below 45 degrees. Cherry trees need from 900 to 1,200 chill hours during which they go dormant, a process that enables normal bud and blossom development.

Warmer winters, particularly a rise in nighttime low temperatures, have caused Del Chiaro's trees to blossom several weeks late and weakened the buds so they can't hold onto the fruit. He has seen his crop yields drop 60 to 70 percent over the past two years.

Yet uprooting his trees and starting over would mean years with no income, waiting for the new trees to mature and bear fruit, he said: "I'm at a point in my life where I don't want to have to wait seven, eight years to change."

Climate models also suggest that global warming will bring more extreme weather.

Ruth Hartnett got a taste of what that could mean last summer, when a heat wave claimed three turkeys on her nine-acre farm on Grand Island, in the Sacramento River near Rio Vista, where she grows fruits and nuts and raises livestock.

This year at least three pear orchards in Hartnett's neighborhood were plowed to make way for hardier crops such as citrus or, in one case, a housing development.

"We seem to be at a tipping point," she said. "People are looking toward economic survival. The undercurrent is, 'How do I not lose my shirt and everything I've ever worked for?'"

Although wine grapes might not suffer major declines in yield, they might suffer in quality. If it's too hot, grapes ripen too quickly and produce flabby wines with too little acid and too much alcohol. Too cold, and a wine's character will tend toward less desirable flavors such as grass or bell pepper.

The Napa Valley region is blessed with a 64-degree average temperature that falls smack in the middle of the comfort zones of many popular varietals, including merlot, syrah and cabernet sauvignon.

But Napa is just barely within the range for chardonnay grapes, which thrive in 57- to 63-degree temperatures. A bump in average temperature of even
1 degree during the growing season could push the valley into questionable territory for chardonnay.

This same small bump would nudge the valley closer to the ideal climate for zinfandel grapes; but a few more degrees could mean disaster for Napa and some of the state's warmer wine-growing regions, such as Santa Barbara and Paso Robles, which might be lost altogether.

"You add another couple of degrees onto warming in Fresno, and it will become real challenging to grow anything other than table grapes or raisins because you can't produce premium high-quality wine in that hot of a climate without technology we really don't have today," said climatologist Gregory Jones of Southern Oregon University in Ashland.

Jones is part of a team that used a computer climate model to look at the future of the U.S. wine industry in a warming world. Published in July in the Proceedings of the National Academy of Sciences, it said 60 percent of the best terrain for premium grapes will be lost by the end of the century if greenhouse gas emissions continue unabated.

Most of the remaining top-quality acreage will shift northward to the Pacific Northwest. California will retain and possibly gain a little bit of territory along the coast, but the inland vineyards, including those in Napa Valley and Sonoma County, will be lost.

Even if production shifts to more favorable areas, a robust market will not necessarily follow.

"There's a tremendous amount of culture and value that's associated with the wine industry where it is," Field said. "It would be a heavy price to pay if we had to move out of there."

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