



another approach. County supervisors asked local organic farmers to work with local conventional farmers, and together to develop a permit process for GMOs. These permits would be considered on a case-by-case basis and would be based on risk assessment. This ordinance-based strategy is in keeping with Lake County's approach to natural resource issues, which emphasizes collaboration, Giusti says. "They're not as quick to try and solve disagreements through political channels. This could serve as a model for other counties to address these conflicts."

In contrast, at the request of proponents only, Trinity County supervisors adopted an anti-GMO ordinance in August, Giusti says. However, the impact will be minimal because 95% of the county is federal land and so is not under the jurisdiction of the ordinance.

Widening implications

Giusti and Lemaux stress the need to work collectively on issues related to GMOs, saying that UC scientists can address people's concerns by providing factual information. "It is not to anyone's advantage to be divided into camps of us versus them," Giusti says. "This is too important and too complex. UC researchers can help by explaining the science that relates to the risks and benefits of GMOs."

The importance of informed debate is growing as the scope and number of anti-GMO initiatives increases. For example, the Butte County anti-GMO measure would keep the California Rice Experimental Station from performing any genetic-engineering experiments on-site. Moreover, the Butte County initiative goes further than Mendocino County's and stipulates exactly what can and can't be grown in the county. Having an "allowed" crop list could be a problem for local rice growers, Lemaux says, because it does not specifically include rice with mutations induced by X-rays or gamma radiation. It means legally these varieties could be banned too, Lemaux says. Much of the rice grown in Butte County fits into this category.

UC researchers can help avoid such problems by checking the wording of initiatives. "We shouldn't be involved in the politics, but people should use us as a sounding board and clearinghouse for accurate information," Giusti says.

In addition, some of the initiatives on the November 2004 ballot ban all GMOs, not just crops and animals. This means they also apply to micro-

organisms and so could affect biotech companies in some counties, like Alameda, Lemaux says.

The county anti-GMO initiatives could also have statewide impact. "If enough of them pass, that could force state legislation," Lemaux says, noting that county pesticide regulations drove the development of statewide regulations. Currently, the state does not regulate GMOs; field-test applications are overseen by the U.S. Department of Agriculture. Alternatively, anti-GMO successes at the county level could help supporters place an initiative on the state ballot.

"Whatever happens in November could change the complexion of agriculture in California," Lemaux says.

— Robin Meadows

▲ Grassroots campaigns against genetically engineered crops have spread to numerous California counties, with four initiatives on the ballot in November 2004 and others in the works for the March 2005 ballot.

Science briefs

Climate-change study predicts California water shortage

California will experience significantly hotter summers by 2100, with resulting impacts on human health and the availability of water that could upend the state's current water rights system, according to a study by team of 19 scientists.

"These new predictions illustrate more than ever the urgent need to control greenhouse gas emissions now," says study co-author W. Michael Hanemann, professor of agricultural and resource economics and director of the California Climate Change Center at UC Berkeley. "Because of lags in the natural system, what we do today will affect climate 30 years from now."

The findings were published in the August *Proceedings of the National Academy of Sciences*; the lead author is Katharine Hayhoe of ATMOS Research and Consulting. Using the most sensitive climate models to date, the researchers studied two scenarios: one assumes a business-as-usual approach to the use of fossil fuels, while the other factors in lower emissions when switching to alternative energy and more fuel-efficient technology. Under the lower emissions scenario, summer temperatures in California would rise 4°F to 5°F by the end of the century; if nothing is done to curb the use of fossil fuel, summer temperatures would rise a dramatic 7.5°F to 15°F. Those figures are several degrees higher than previous models had predicted, particularly in the summer months.

Statewide, the length of the heat-wave season could be dramatically extended from an average of 115 days per year to 178 to 204 days by 2100, while the Sierra snowpack could decline by as much as 90% if fossil fuel use isn't curbed, the study finds.

"Increases in temperature decrease water availability while increasing demand," Hanemann says. "It will no longer just be a battle among the farming industry, the environmental groups and the cities, but those within each interest group will be competing with each other for water."