Article published - Oct 24, 2005
MEASURE M - GENETICALLY-MODIFIED ORGANISM BAN

Science of GMOs

Voters looking to research for guidance on Measure M will find conflicting evidence

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THE PRESS DEMOCRAT

Scientific researchers are at war over basic questions about genetically modified organisms - whether they are safe in food, spread to crops in other fields and actually reduce use of pesticides and herbicides.

Voters looking to science for answers about the proposed GMO ban on the Nov. 8 ballot will find ample ammunition amassed on either side of the argument. And both sides in the Measure M campaign are hurling conclusions from research studies as authoritative sources for their positions.

"There is a lot of selective citation going on in the GMO debate," said Rick Roush, an entomologist at UC Davis and director of the university's integrated pest-management program. "They cite one study that supports their view and ignore the one that refutes it."

He said: "I'd say voters should look at where the preponderance of scientific views is gathered."

Since genetic engineering in crops was introduced for commercial production in 1996, scientific research has centered on three key issues:

Are GMOs safe for human consumption? The bulk of research says yes, but critics say the data is tainted by biotech-industry funding and risks are rarely studied.

Do GMOs spread from one field to the next through pollination? Possibly, but the studies are as controversial as they are contradictory.

Do GMOs reduce pesticide and herbicide use? Initially yes, but nature takes its course as fields become more productive yet also less resistant to weeds and pests.

Those are precisely the questions facing voters who will decide Measure M, an initiative that would place a 10-year moratorium on GMOs in Sonoma County.

Although such a ban would initially affect only a handful of farmers who grow corn for animal feed, it has great symbolic impact and could have implications for the use of human and animal vaccines, as well as biotech protection for vineyards.

Across the United States, GMOs have worked so well to increase acreage productivity and boost profits that more than 106 million acres of GMO crops - mostly corn, soybeans, canola and cotton - have been planted.

In 2004, 45 percent of corn acreage, 85 percent of soybean acreage and 76 percent of cotton acreage was in genetically modified varieties, according to the Pew Initiative on Food and Biotechnology, a nonpartisan research project.

Many major food and scientific organizations endorse GMO crops, especially as a means to solve the world's hunger problem.

Perhaps the most comprehensive review was conducted by the European Union, which examined the work of 400 research groups and found GMOs present no risk to human health or the environment when compared with conventional plant breeding.

"The important point to take away is that GM crops are substantially equivalent to others being grown. They are no better or worse," said Allen Van Deynze, a plant genetics researcher at UC Davis. "They may be different in resistance to insects, but the rest of the traits are no different."

Van Deynze is principal investigator on a UC Davis project trying to improve the yield of a tomato plant by introducing a gene found in a plant in the mustard family that is commonly found growing in Bodega Bay sand dunes. If successful, tomatoes would use less fertilizer and less water.

By genetically grafting a specific gene from one organism to another in order to obtain a desired trait, scientists can produce new varieties of plants that tolerate herbicides and require less pesticide application.

This allows farmers to spray their fields to eliminate weeds without damaging their crop, and pests like borers and worms encounter a toxic protein when they munch into plants.

Environmentalists, however, argue that there have been precious few studies assessing the environmental and health risks of such GMOs. They point to research that turned up evidence that modified organisms had spread to nearby fields, which creates a serious risk for organic farmers and those using traditional farming methods that don't rely on chemicals.

"Our experiments revealed that the transgenic DNA is turning up in unpredictable places," said Ignacio Chapela, a microbial ecologist at UC Berkeley whose research found GMOs had invaded traditional Mexican maize. "If you look in the valleys, areas of industrial agriculture, you find more, closer to the roads you find more."

Chapela, who was in Sonoma County last week to address a Measure M fund-raiser at Benzinger winery, acknowledged that voters are likely to be confused by conflicting scientific research.

"There is a herd effect in GMO research with funding stampeding toward product development," Chapela said. "Nobody's funding risk-assessment studies that might find problems and resolve contradictions."

Chapela's research in the corn fields of Oaxaca, Mexico, is cited by Measure M proponents as a

prime example of scientific research against GMOs, along with research done by Charles Benbrook, director of the Northwest Science and Environmental Policy Center.

Benbrook's research of GMO crops showed herbicide usage dropped from 1996 to 1998, but substantially increased through 2003 as they grew more tolerant of herbicides like Roundup.

Both studies came under attack.

Patrick Moore, a Greenpeace founder who was in Sonoma County earlier this month to speak against Measure M, criticized Benbrook's studies for incorrectly concluding that more herbicide tonnage was necessarily bad. Tonnage of the herbicide glyphosate had increased, Moore said, but "that's good because it is a benign one and not a nasty one, although it is heavier and therefore bound to drive up the tonnage figure."

Meanwhile, Chapela encountered a furious attack from within his own school's biology department when the results of his research were published in 2001 in the magazine Nature. Later, Nature took the unusual step of disavowing the research.

A team led by scientists from Ohio State University examined the same territory in Oaxaca in 2002 and 2003, finding no evidence that genetically modified corn had invaded maize.

"There is no simple explanation why research differs, Roush said. "I am baffled about what happened. For a lot of scientists it raises the question whether there was any problem to begin with, or whether GMOs did not persist. It has left us scratching our heads."

ON THE WEB

Pew Initiative on Food & Biotechnology: Found U.S. accounts for 63 percent of world's GMO crops, mostly corn, soybeans and cotton. pewagbiotech.org. Search site for "Genetically Modified Crops" report Aug. 2004.

UC's Department of Agriculture and Natural Resources: Links to published GMO research. ucbiotech.org. See resources section.

Charles Benbrook's study: Found pesticide use decreased after GMOs introduced, but usage increased later. www.biotech-info.net/technicalpaper6.html

U.S. Department of Agriculture Economic Research Service study: Found pesticide use decreased and profitability increased in GMO corn and cotton crops, but not in soybeans. ers.usda.gov/publications/aer810/

Ignacio Chapela's study: Found genes from GMO corn had "contaminated" traditional Mexican maize. www.nature.com. Search "Trans-genic DNA Introgressed into Traditional Maize in Oaxaca, Mexico," by D. Quist & I.H. Chapela, Nov. 2001. Vol. 414.

European Commission review of GMO research: Review of 400 studies found GMOs present no more risk than conventional plant breeding. europa.eu.int/comm/research/quality-of-life/gmo/index.html