

IMPACT

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IMPACT is a series of publications highlighting how UC Davis' College of Agricultural and Environmental Sciences makes a difference in the lives of Californians. Through research, teaching, and outreach programs, UC Davis research touches almost all aspects of Californian life. Today, millions of people eat safer foods, breathe cleaner air, and drink healthier water with the help of our researchers. We're making discovery work -- for California and the world.

RESPONDING TO GLOBAL CLIMATE CHANGE

THE ISSUE

By the turn of the next century, the earth's average air temperatures could rise by 3 to 10 degrees Fahrenheit – a consequence of increasing levels of greenhouse gases such as methane, carbon dioxide, and nitrous oxide from the combustion of fossil fuels used in transportation, power plants, and industrial factories. The impact of these atmospheric changes will ripple throughout the world in ways that no one can predict with absolute certainty.

Yet global climate change is expected to have major impacts on California. Rising temperatures could shrink the amount of snow in the mountains and reduce water supplies. A warmer climate could alter the types of crops we grow, reduce production and quality, and cause new pest problems. Fresh produce could become less available and more expensive.

California enacted legislation in 2006 to curb greenhouse gases. The agricultural community can help achieve reductions through new farming practices that limit emissions, cut fuel use and store carbon in the soil. Industry, government leaders and researchers in the College of Agricultural and Environmental Sciences at UC Davis are working together to prepare for the changes ahead.

WHAT WE'RE DOING

Air quality experts in the Atmospheric Science Program housed in the Department of Land, Air and Water Resources (LAWR) are modeling climate



Jack Kelly Clark / UC ANR

change impacts. For instance, UC Cooperative Extension (CE) biometeorology specialist Richard Snyder is working with plant sciences professor Shu Geng, state water resources analyst Morteza Orang and others to project how climate change may affect agricultural water demand. Their computer simulations show that crop water requirements will probably change little because higher carbon dioxide levels and dew point temperatures will counteract the effect of higher temperatures. However, a warmer California climate would restrict crop choices. Citrus production could be pushed northward in the Central Valley and deciduous orchard crops with high chilling requirements could see production losses.

Department of Plant Sciences pomologist Ted DeJong is investigating how higher, early spring temperatures

reduce the size and yield of fresh market peaches (and other tree fruits). More variable weather – especially late spring and summer rain – would have major consequences such as increased fungal diseases. “Fruit and nut production will be in jeopardy if climate change brings higher early spring temperatures and more variable rain patterns,” DeJong says.

Many UC Davis scientists are studying soil carbon cycling to determine agriculture’s potential for climate change mitigation. Plant scientist Johan Six and colleagues found that reduced tillage can cut fuel carbon dioxide emissions by half and that cover crops turn farmland into effective carbon sinks. LAWR professor Kate Scow, recent director of the Kearney Foundation of Soil Science, funded a number of research projects on soil carbon. “Carbon sequestration in agriculture may be part of the solution,” Scow says. “Agricultural systems could offset up to 5-10 percent of global greenhouse gas emissions through a combination of reduced tillage, use of winter cover crops, set asides and perennial grass crop rotations.”

At the UC ANR West Side Research and Extension Center in the San Joaquin Valley, plant sciences CE specialist Jeffrey Mitchell is promoting a low-impact form of agriculture called conservation tillage. This practice minimizes cultural activities like plowing, disking, and chiseling. It saves fuel, cuts exhaust and dust emissions, reduces labor costs and has the added environmental benefit of leaving greater amounts of soil carbon than conventional tillage practices. Mitchell spearheads the California Conservation Tillage Workgroup – a network of nearly 1,000 growers, faculty members, government

conservationists and equipment manufacturers. Hands-on demonstrations are helping growers learn how to use cover crops and to become familiar with new farm equipment for planting directly into untilled soil.

UC Davis scientists are delivering the latest climate research information to policymakers. In 2005 the campus hosted a climate change symposium, Challenges and Solutions for California Agricultural Landscapes. Faculty members assessed the potential impact of climate change to agriculture in a report prepared for the California Environmental Protection Agency. An effort led by LAWR Chair Jan Hopmans and the UC Davis John Muir Institute of the Environment is developing seminars and white papers for policymakers, regulators and agency personnel to examine how Californians can respond to the world’s changing climate.

A SHARED VISION

New research is deciphering how climate change may affect California. New tillage practices are helping farmers reduce greenhouse emissions. New educational efforts are keeping state leaders up to date. The College of Agricultural and Environmental Sciences is also hiring new faculty in interdisciplinary fields related to global environmental change and encouraging its study among students.

That’s impact – creating the scientific foundation for improved agricultural practices and informed policymaking to cope with a global environmental problem facing California and the world.

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