

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.

ENHANCING AGRICULTURAL BIOSECURITY

THE ISSUE

California agriculture accounts for \$27 billion in annual sales of more than 350 different crops and livestock commodities, generating over \$70 billion in related economic activity. The USDA considers farms and the food supply among the nation's most exposed targets for terrorism. Whether introduced accidentally, naturally or as a weapon of biological terrorism, disease and pest organisms that affect our food supply also impact our health and exact a toll on California's economy.

WHAT WE'RE DOING

The College of Agricultural and Environmental Sciences (CA&ES) has been solving food-security problems since its inception almost 100 years ago. Scientists at CA&ES conduct research to diagnose diseases and respond quickly for homeland defense.

Building detection networks. "Here in the West, we're particularly vulnerable to accidental or intentional introduction of plant diseases and pests because of our coastline and its many ports," assesses Richard Bostock, professor of plant pathology and director of the Center for the Western Plant Diagnostics Network.

The new center, coordinated by CA&ES, works closely with the California Department of Food and Agriculture (CDFA) as one of five regional networks that form the National Plant Diagnostics Network.



Housed at land grant universities, the networks leverage the expertise of researchers and bring additional resources to pest diagnostics. UC Davis' center works with partners throughout ten western states, including Hawaii and Alaska, to integrate detection and diagnosis of plant-health problems. It links farm advisors, researchers and diagnostic labs in the region, sharing information to protect crop plants and agricultural ecosystems against pests and diseases.

Take the example of sudden oak death. Appearing in the mid-90's, it took years to recognize. New coordination moves diagnoses closer to real time. Says Bostock, "If something shows up in a nursery, the nursery may be quarantined and then you can't ship anything. California nurseries ship all over the world." The

network focuses on intentionally introduced quarantined pests and pathogens. "At this point, many of us feel it's not a question of if, but a question of when."

Carla Thomas, the center's assistant director, coordinates nationwide epidemiological work to analyze outbreaks and determine if they are malicious in nature. The innovative networks include communication with law enforcement -- speeding access to intelligence and ensuring bio-terrorists are prosecuted -- and training. The center is developing a program to increase first detectors, e.g., master gardeners, cooperative extension advisors and specialists and crop consultants, trained in what to look for and how to report findings to ensure early detection.

For example, a first detector who suspects something immediately sends a sample to a diagnostic lab, signaling an internal network alert. A positive finding by the diagnostic lab triggers a confirmation analysis by the USDA. People are alerted to watch for outbreak patterns and other indicators of malicious intent. This goal takes an isolated incident that may be missed for months or years and integrates the incident into the national system within a week.

Pre-emptive Pest Research. A complex of break-resistant, hermetically-sealed greenhouses and laboratories make up the Contained Research Facility. Here research on agricultural pests and plant diseases can be carried out in a highly secure, Biosafety Level III environment. Michael Parrella, professor of entomology and associate dean in the college, is acting director for the \$17 million facility, equipped soon to house research and development projects related to agricul-

ture, especially those involving invading pests and disease-causing organisms. Prior to this facility, federal and state regulations prohibited research on quarantined pests and diseases. This secure facility allows California's researchers to study such problems as the Glassy-Winged Sharpshooter, sudden oak death and fire ants.

Leveraging Technology for Diagnosis. Professor Susan Ustin, in land, air and water resources, contributed to a recent white paper for the U.S. Department of Defense as a GIS expert. Teamed with UC Davis experts, she studied the use biological data to predict the impact and spread of 20 of the USDA's 'most notorious' agricultural pests and diseases.

GIS technology can track the spread of these infectious agents. The pests and diseases studied affect both livestock and plants and require different data to drive spatial models that trace and predict the pests' paths. The potential for farm savings is great. Farmers can make better-informed management decisions and regulatory agencies can use these data to better deploy control and eradication efforts.

A SHARED VISION

To protect against terrorist threats, our nation is spending billions -- including investment in California's plant and animal life. CA&ES and its partners in agriculture and public health are at the forefront of these efforts.

That's impact - science and public safety at work together.

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