shows that fruit preferences in Asia are different than those in the United States," Crisosto says.

Similar work was carried out with 400 American and 250 native Chinese consumers to determine the two ethnic groups' acceptance of 'Redglobe' table grapes at different maturity levels.

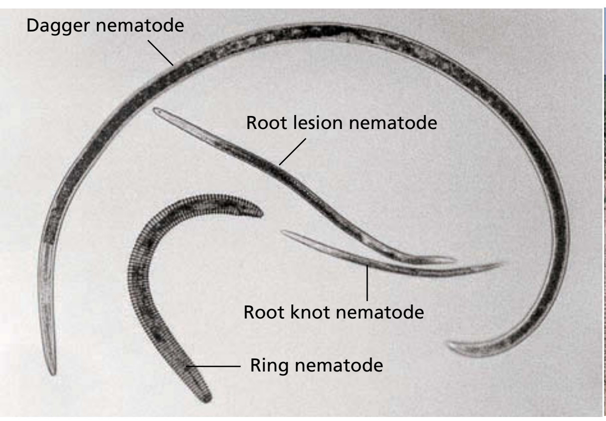
At Kearney, Crisosto conducts fruit tasting tests with panels drawn from staff who have been screened for their taste acuity and trained for a specific test. "Most of the panelists enjoy it," she says. "They get a break from their work and they know they are making a positive contribution to the furtherance of our scientific knowledge of fruit quality."

Managing fungal diseases. UC Riverside plant pathologist Jim Adaskaveg is leading postharvest pathology research on stone fruit, pome fruit, kiwifruit, pomegranates and citrus. Recently, he initiated a citrus incubation program at the postharvest center that protects the Korean market for the California citrus industry. In 2003, Korea closed its market to California oranges after detecting the fungal disease Septoria spot. After negotiation and study, Adaskaveg and his team, working with the citrus industry and the U.S. Department of Agriculture, arrived at a plan. The team collects and incubates fruit samples at the center, then assesses them 20 days later for Septoria spot. Fruit positive for the disease are identified and photographed, and the results are provided to the packinghouses. This program was in part responsible for maintaining the $100 million citrus trade between the two countries.

For other crops, Adaskaveg and his team have developed several new reduced-risk postharvest fungicides. They are evaluating new application strategies to improve disease control (see page 109) and have identified diseases like sour rot that have recently become more of a problem for the stone fruit industry.

Ultimately, all the scientists working on postharvest studies at KREC share the same goal, Gayle Crisosto says. "We want to consistently provide good-tasting fruit to the consumer so they'll come back for more." — *Jeannette Warnert*

Stephanie Kaku



A variety of plant parasitic nematodes can sap nutrients from the roots of trees, vines and field crops.

Michael V. McKenry

Vines stunted by root knot nematodes.

After years of hosting an orchard or vineyard, nematodes will have colonized and reproduced to levels that would put a new planting in grave danger.

UC nematologists battle tiny underground pests

Nematodes are the most numerous multicell animals on earth. One cup of soil can contain thousands of the tiny worms. Some are beneficial, but many cause significant damage to agricultural crops.

"You can see insects, and diseases often cause visible symptoms," says Philip Roberts, a UC Riverside nematologist. "The underground feeding of nematodes can be just as harmful, but it is much more difficult to detect."

Roberts and UC Riverside nematologist Mike McKenry, who is based at the UC Kearney Research and Extension Center, preside over a specialized program that offers pest management professionals and growers the latest information on nematode problems and solutions. Their work is particularly important due to past and upcoming bans on chemicals that have traditionally been used to rid soils of nematodes before planting, such as DBCP and methyl bromide.

Perennial crops. As part of his focus on perennial crops, McKenry has pursued "chemigation" as an alternative to preplant methyl bromide soil fumigations. McKenry has developed methods and equipment that use water to carry low-fuming biocides (with short half-lives), 5 feet deep. Large volumes of water can also prevent biocides from escaping at the field surface. By 1991, he demonstrated that in highly porous soils, chemigation with biocides such as metam sodium could provide nematode control equivalent to that of methyl bromide. "Today, new products and equipment for preplant chemigation are plentiful," McKenry says.

A promising new natural treatment for nematodes


Max Clover

Root knot nematodes can cause galling and forking of carrot roots.

was discovered in 1979 by McKenry and his UC Riverside colleagues. The scientists identified microorganisms that were protecting five Fresno County peach orchards from root knot nematodes. The fungus, *Dactylella oviparasitica,* was found to be attacking the pest's eggs.

"This fungus has now been noted in other field settings and in other regions involving other nematode species," McKenry says. "Research is slow and we still do not know how to correctly inoculate fields, but this fungus ranks as a top nematode control agent within nematode-infested soils and is naturally at work in the San Joaquin Valley."

Another method of nematode control is the development of resistant rootstocks. In 2003, McKenry's lab released two new grapevine rootstocks that possess broad nematode resistance.

These and other advancements are of particular interest to growers who plan to replant orchards or vineyards. When land that has not previously been used to cultivate crops is converted to agricultural use, nematodes that damage trees and vines are at a minimum. After years of hosting an orchard or vineyard, however, nematodes will have colonized and reproduced to levels that would put a new planting in grave danger. This is called the "replant problem." To address the complex issues associated with replanting, McKenry has made a 70-page report available for free on his nematode Web site.

Annual crops. Based at Kearney in the 1980s, Roberts established two experimental sites to study nematodes in annuals. The research sites were each inoculated with a distinct species of root knot nematode, the most problematic nematode on San Joaquin Valley commercial farms.

Over the last 20 years, Roberts and other scientists have identified genes that give plants natural nematode resistance, including in tomato, carrot, cotton, sugar beet and various dry grain beans. From the work at Kearney, there have been releases of several nematode-resistant black-eyed varieties, and breeder release lines of resistant carrots that are now being used by seed companies to develop commercial varieties.

Roberts has also been looking at a range of control options to avoid subjecting nematodes to selection pressure by repeatedly growing the resistant crops. He has found, for example, that crops susceptible to nematodes can be planted following some resistant crops without dramatically reducing yields. Cultural practices can also play a role, he says. "If you plant carrots at a cooler time of year, when nematodes are less active, you avoid some plant damage."

— Jeannette Warnert

For more information

Michael McKenry's nematode site:
www.uckac.edu/nematode

Science brief

Lygus study validates treatment thresholds

Lygus bugs *(Lygus hesperus)* are a common insect pest in the San Joaquin Valley, affecting everything from cotton to pistachios and many other commodities. Kearney-based IPM advisor Pete Goodell conducted a study in 1996 of how this pest affects blackeye beans and discovered that the timing of the infestation has more to do with subsequent damage than the sheer number of pests.

In brown exclusion cages, varying densities of Lygus bugs (0, 20, 60 and 120) were released before and after flowering. The bugs were allowed to feed for 2 weeks. Yield data was collected and evaluated to determine impacts on quantity and quality. Field assistants collected Lygus bugs from the bean field with a vacuum sampler.

"We found that the timing of the infestation has more impact on yield than numbers," Goodell says. "Beans are more sensitive to pressure from equivalent Lygus populations after flowering. Presumably, bean plants damaged early were able to compensate for any damage caused before bloom."


Jack Kelly Clark

Field assistants Tommy Koga and Jake Gregory sample for Lygus bugs in a blackeye bean plot with exclusion cages.

This study, supported by the UC Statewide IPM Program and Dry Bean Council, showed that treatment thresholds developed for older varieties were still valid for newer varieties.

— John Stumbos