cally command all the valves, pumps, wells, whatever is associated with irrigating a particular set, ON at the right time and in the right sequence and then OFF on a schedule. Alarms can be established all through the process so you will know if something is amiss. But even then, we strongly recommend a mechanical high-pressure shutoff in the main line, "just in case."

There is more! Assume you have two or three soil moisture sensors installed in each irrigation block. You can specify an average for these sensors so, when this value is reached, and the actual run-time is within 20 percent of programmed run-time for that set, irrigation will terminate in that block and commence in the next programmed block. Pretty neat, huh? But you have to use your experience as well. If you think you are on the dry side, simply increase the average value until you get the result you want. Now you are using the system to its full potential to help you apply the right amount of water.

There is still more! Remember the well? With optional software module called Xcontrols, you can set a water level for the well at which the well pump will shut off, saving you the possible expense of pulling and replacing the pump. With a water level sensor in a pond or storage tank, you can program the well or booster pump as necessary to keep the water between a low and high-level set point.

While all of this is easy to learn, you won't learn it all at one time. We recommend you commence slowly, using system capabilities a bit at a time until you become accustomed to sensor values and know what to expect. Then we will help you commence to use some of the more advanced features of the system. How? All you have to do is install Laplink on your PC so we can dial your modem and access your PC. Then we can talk to you on one phone line while using another to your modem to run the mouse pointer remotely from our office, demonstrating the next step and then watching you complete the process yourself.

In conclusion, this system has big name capability and big name reliability without the big name cost. Municipal water districts use the same water management sensors and software to automatically control wells, pumps, tank water levels and system distribution valves, and have been doing so reliably for years. The Automata system offers everything needed for agriculture and general water management in one package — application specific sensors, field stations, telemetry and a flexible software package. For more information, you can call Lenny Feuer at Automata, (800) 994-0380 or me at (760) 480-7884 or via email at Walters@agricast.com. CG

Citrus Research Board Update

It seems that a new agricultural pest or disease rears its ugly head in California on a regular basis. Devastating pests cause growers millions of dollars in treatment costs and millions more in losses due to the destruction these pests leave in their wake. Many of the Citrus Research Board's projects relate to citrus pests and how to combat them.

Diaprepes Root Weevil

Diaprepes abbreviatus, known as the Diaprepes root weevil, is slowly working its way toward California.

This weevil, similar to the cotton boll weevil, came into Florida's Orange County on ornamentals in 1964 and recently, officials found Diaprepes larvae in Texas citrus near McAllen in the Rio Grande Valley.

Joseph Knapp, an integrated pest management specialist for citrus at the University of Florida Citrus Research and Extension Center, was in California not long ago to talk to growers about the threat. Florida citrus growers pay a box tax, which funds Diaprepes research to the tune of more than $325,000 a year. While Diaprepes root weevil is a destructive pest of citrus, it also attacks nearly 300 types of plants, including numerous ornamentals and root crops. Currently, the pest is confirmed on more than

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50,000 of Florida's 850,000 acres of citrus.

One of the more distressing aspects of the pest is the fact that there are no effective chemical treatments, making it difficult to control once detected. Knapp predicts "it might take from three to five years to kill an orchard by girdling the roots of trees."

In the early years, control of the root weevil was relatively simple. One application of Aldrin on the soil lasted five years. But in the 1970s, the Environmental Protection Agency banned the chemical. The weevil was controlled so effectively, researchers fell five years behind in their work on the pest because there were none around to make research possible, Knapp explained.

Researchers are looking at predators and parasites to help stem the tide of Diaperpes development and they have discovered that the root weevil won't lay eggs on leaves covered with oil.

**Citrus Canker**

Citrus canker is a bacterial disease of citrus that causes premature leaf and fruit drop. It is a highly contagious disease, say researchers, and can be spread rapidly by: windborne rain, lawn mowers and other landscape equipment, animals and birds, people carrying the infection on their hands, clothing, or equipment, and moving infected or exposed plants or plant parts.

Although phylogenetically different strains of Xanthomonas cause citrus canker, the symptoms elicited on susceptible hosts are the same, and the bacterial signs are the same. Citrus canker first appears on leaves as oily looking, 2-10 mm circular spots. Circular lesions on leaves, stems, thorns and fruit, become raised and blister-like, growing into white or yellow spongy pustules. These darken and thicken into a brown corky canker, which is rough to the touch. Defoliation and premature abscission of affected fruit occurs on heavily infected trees.

The Florida approach to citrus canker eradication has evolved over time. In the first program from 1915 to 1933, infected trees were usually doused with fuel and burned. In later programs, infected trees have been removed mechanically. The necessity of removing exposed and obviously infected trees was recognized in the 1986 program, and a guideline calling for removal of all citrus within 125' of infected citrus was adopted. In the latest eradication program, the 125' radius was deemed inadequate for eradication. Thus, a general policy of removing infected trees plus all exposed
trees within a 1900’ radius is now in place.

**Citrus Leafminer**

The devastating Citrus Leafminer (CLM) lurks in dooryard locations in California, but has not yet been found in commercial plantings. CLM is a serious pest of citrus and has been implicated in the spread of citrus canker.

In 1993, CLM was found in seven citrus nurseries in Homestead, Florida. It spread through Florida in approximately 3 months, and into Alabama, Louisiana and Texas the following year. In 2000, CLM was detected in Imperial County and in the area around Mexicali, Mexico.

CLM larvae damage citrus leaves by mining them, retarding the growth of young trees and nursery stock. Significant stunting can occur if young trees are not protected from CLM until they are about 4 years old. Grapefruit and pummelo seem to be most heavily damaged, while lemons, limes and mandarin oranges are least susceptible.

Biological control is the most effective management tactic for CLM on bearing citrus, according to John Heraty, a UC Riverside entomologist. In Florida, native parasites have parasitized 50 percent or more of CLM larvae in selected groves. Classical biological control programs were initiated in Florida, Louisiana, and Texas. In 1994, Florida researchers imported three parasitoids from Australia. Only Ageniaspis citrulina has shown potential as a control agent for CLM in the southern US, said Heraty.

Ageniaspis citrulina oviposits in the eggs and small larvae of CLM. The adults are short-lived and thrive in hot, humid conditions. The parasite appears climatically adapted to the humid tropical and subtropical climates of Florida and Louisiana. In south Texas, releases were made in 1995-96; however, no recoveries have been made in the years after release, suggesting that the south Texas’ environment is unsuitable for A. citrulina.

Ageniaspis citrulina’s efficacy in Southern

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**Government**

**Trouble For Golden State Ag**

By George Soares

California agriculture is in big trouble, but few seem to know and even fewer seem to care. Worse yet, California, the world’s sixth largest economy seemingly has no game plan to turn around agriculture’s downward spiral. The very state that prides fully and frequently announces that it is showing the way for its 49 sister states is learning the bitter lesson that it’s not quite as important and influential as it may think. Other states are not necessarily following our lead; a circumstance that has placed California farmers at a competitive disadvantage with their brethren throughout the United States.

It would be wrong to claim that all three hundred plus crops we grow are in the red, but the economic trend for our industry is not good and there are few bright spots on the horizon. For too many the income and expense lines have crossed and producers are scrambling. Cotton farmers, for example, are cutting back this year by an estimated 150,000 acres from the usual one million acres grown in the state. Some are choosing to grow other crops, many of which are already over planted, while others are focusing the land and selling their water.

Think about it. California farms, in the business of producing food and fiber for the world, finding more value in a crop input than the commodity itself.

How did things get so turned around? No one reason for sure, but the lack of a coherent and consistent ag policy must rank at or near the top.

Nationally, without a lot of fanfare, the fair trade aspect of free trade with our world neighbors has been reduced to lip service. Decades ago energy and the nation’s food supply were both part of our national security. Energy remains.

The bad news is that there is plenty of blame to go around, and California is deserving of a major share. As a state we are bankrupting the ag industry and it didn’t begin yesterday. Consider the following: Decades of paying no to water development; Minimum wages that surpass the federal standard and most other states as well; energy costs — electricity, natural gas, propane and diesel — that defy description or reason; the most expensive pesticide regulatory program in the nation, 70 percent of which is funded by farmers; state tax on agriculture equipment that doesn’t exist in 38 states and is the most extreme of the other 12.

Whether by accident or design, California is once again in the lead, this time as the most expensive place in the United States to farm. And, without some reality check the problem will become more extreme.

An urban legislator said recently that to his surprise, California is actually an ag/ural state. That is certainly the case from a land mass standpoint, but the population centers make it an urban state in its thinking and actions and it’s more so every day.

In this atmosphere it’s hard to imagine that we will receive much more than superficial recognition of the value of agriculture to California. That is our reality. Even so, what choice is there but to try? Maybe, just maybe, the enormity of the crisis in California agriculture today is our opportunity to regain some lost ground.

Bill Lyons, our Secretary of Food and Agriculture, is trying. With the support of Governor Davis and the state Legislature he has formed a coalition of key ag states — New Mexico, Florida, Arizona, California and Texas (N-FACT) to shape national agriculture policy. It’s too soon to judge but the group seems to be adding value to the member states. With hoof and mouth disease threatening our borders, to name just one of many challenges, we will need all the creativity we can muster.

Assemblyman Mike Briggs (R-Fresno) is pursuing a good idea and receiving bipartisan support. His AB 19X proposes to repeal the state sales tax on diesel used in agriculture for the year. He and his colleagues correctly reason that farmers need the help and that the run up on diesel prices has been a windfall for the state, some of which should be returned to those who need it most.

Assemblyman Dennis Cardoza (D-Merced) is leading the charge to repeal the state sales tax on farm equipment with his AB 7. It makes sense but will cost the state about twenty million dollars annually in lost revenue. Are term limit legislators and the Governor willing to make the sacrifice for our industry? We will know soon.

Relief of any kind is appreciated, but California must move beyond patchwork measures. Well reasoned California farm policy that is factored in when budgets are adopted and legislation approved is essential.
California should be investigated when CLM arrives in the state's coastal region. The parasitoid's establishment is more likely in this region because of the region's more humid climate.

Researchers in California anticipated CLM's arrival in the state and began studies in 1996 to determine the indigenous parasitoid complex associated with leaf miners in Southern California, Heraty explained. An extensive survey detected a diverse complex mimicking the diversity of families and genera attacking CLM worldwide. In addition, a gregarious eulophid, Ceroplastes coehaela, was identified as a very effective native parasitoid of Marmara species in the Coachella Valley, including the citrus peel miner, Marmara n. sp. on grapefruit.

David Headrick, assistant professor of entomology at California Poly, San Luis Obispo, has studied CLM in several international settings. Leafminer invaded Mexico in the mid-1990s and spread quickly. Native parasitoids adopted the new host and growers have learned to live with it. The same is true in the Queensland region of Australia where they have lived with CLM for more than 30 years.

Headrick noticed that even with the leafminer infestation, he saw several varieties including navel, mandarins and lemons and the trees all looked healthy with beautiful fruit. They have two parasitoid species that do most of the work — Ageniapis cinctula and Ceroplastes quadrifasciatus that were introduced from Asia into Queensland. Depending on the season, parasitism levels range from 20-90 percent.

CLM doesn't impact mature trees very much, even during the spring flush. They use larvicides or oil sprays as an oviposition deterrent. Adult females don't seem to like to lay eggs on leaves that have recently been sprayed, Headrick said.

"The leafminer perspective gives us cause to not let our guard down in California," he said. "The leafminer may come in and establish and parasites may do a wonderful job, but we've learned that the Central Valley has a very different complex of miner parasitoids from Southern California. We need to be ready to implement a biological control program in the San Joaquin Valley."

**Asian Citrus Psyllid**

The Asian citrus psyllid, Diaphorina citri Kuwayama is another of the world's most serious pests of citrus. The Asian citrus psyllid is of particular importance because it is already established in South and Central America as far north as Honduras. In June 1998 the Florida Department of Agriculture found it in southeastern Florida.

The Asian citrus psyllid causes damage to the crop primarily by transmission of the pathogen that causes greening. The disease causes chlorosis resembling zinc deficiency, twig dieback and reduced fruit size and quality. Fruit do not color up properly, leading to the name greening. University scientists believe the disease complex may be the most devastating of graft and insect-transmissible pathogens of citrus in the world.

How D. citri got to Florida and where it came from is currently unknown. A survey conducted in June 1998 by Division of Plant Industry personnel indicated that D. citri infests citrus in Palm Beach, Broward and Martin counties, and the Indian River citrus growing area. The full extent of the infestation is being determined, but according to Connie Riherd, Division of Plant Industry in Florida, D. citri is too widespread for successful eradication efforts.

The pathogen, Liberibacter asiaticus, is a phloem limited bacteria. Fortunately, it has not been found in the Western Hemisphere, and no disease resembling greening has been reported in citrus in South or Central America.

Adult Asian citrus psyllids are small (3-4 mm). They feed on leaves and stems and are most likely to be found on new shoots, and population increase occurs during periods of active plant growth.

If this psyllid species arrived in Florida carrying greening disease with them, the impact on our industry could be very serious. Tests are being conducted now to determine whether the psyllids arrived free of the disease. Even if the psyllids don't have the disease at this time, officials know that a future introduction of the pathogen would result in effective transmission of the disease by the psyllids that are now there.

Now that D. citri has invaded Florida, an important next step is to import natural enemies of the pest in a classical biological control program. Generalist predators include lacewings, syrphid flies, lady beetles, spiders, and several species of parasitic wasps the most important of which is Tamarixia radiata. However, most of these native natural enemies are not expected to suppress the pest populations to a non-economic level.

Four main environmental factors regulate citrus psyllid populations: flushing rhythm of the citrus, weather extremes, condition and nutritional status of flush, and natural enemies.