California Department of Food and Agriculture

2012 Specialty Crop Block Grant Program

Research-Plant Health and Pest Challenges

California Department of Food and Agriculture

$303,044

Title: Host Range Testing of the Olive Psylla Parasitoid

Abstract: Olive psylla was first reported in California in 2007. It attacks only olive trees and was found at multiple sites in San Diego and Orange counties. It has since spread to Riverside and Los Angeles Counties, and one private home in Monterey County. Based on its distribution in southern Europe, this pest has the potential to spread throughout most of the state's olive growing regions. The psylla attacks flower buds and has been reported reducing up to 60% of olive yields in the western Mediterranean. CA Department of Food and Agriculture (CDFA) recently collected the most important parasitoid attacking olive psylla in southern Europe. CDFA has now had Psyllaephagous euphyllurae (Encyrtidae) in culture for over 1.5 years. The focus of this project is to conduct host range tests needed to obtain a permit to release this parasitoid into commercial olive trees. Since olive psylla attacks flower buds, permanent populations of this new natural enemy have the potential to permanently reduce numbers of olive psylla and increase yields.

Regents of the University of California, Davis

$187,055

Title: Sensing Method for Rapid, Non-destructive, Reliable Detection of Aflatoxin in Almonds

Abstract: The occurrence of aflatoxin (AF; a carcinogenic substance) in almonds, beyond a permissible safe limit (20 ppb in USA, 10 ppb in the EU) is a concern for its trade, particularly to export markets. Detection of AF infested almonds in California is currently performed by chemical analysis on a random sample taken from a lot. However, the existing destructive method is unreliable as AF distribution in the lot is highly heterogeneous as AFs are often concentrated in very small portion of the lot and increased sampling is costly using this method. Studies in other commodities have shown that AF contamination results in chemical and textural changes that can be sensed by changes in their optical properties. These methods can reliably detect AF in corn, Brazil nut, chestnut, and hazelnut. The Regents of the University of California, Davis (UCD) propose to develop a rapid, non-destructive optical sensor for AF contamination in almond as a management tool for reducing fungal contamination, and promoting delivery of high quality almonds.

Regents of University of California, Davis

$124,874

Title: Developing Integrated Pest Management Programs in Mint Emphasizing Biopesticides to Improve Crop Profitability and Sustainability

Abstract: In California (CA), 5,000 acres of mint are grown in the northeastern counties of Shasta, Lassen, and Siskiyou valued at $5-7 million annually. This specialty crop is grown for herbal tea and its essential oils, used in personal care products and confectionary flavoring. Two spotted spider mite and mint root borer and cutworm larvae attack mint. Damage results in decreased oil yield and quality and reduced productive expectancy of mint stands. These pests are the target of considerable insecticide use which is potential problematic in these environmentally sensitive areas. Botanical and Bacillus thuringiensis (Bt)-based biopesticides have several favorable characteristics and can effectively control arthropods. However, these are underutilized in current mint integrated pest management (IPM) programs. The objective of project is to develop biopesticide-based IPM programs to control key arthropod pests on mint thus improving the sustainability and profitability of CA mint production.
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<th>Regents of University of California, Riverside</th>
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<td><strong>Title:</strong> Developing a management plan for the Asian citrus psyllid in retail nurseries</td>
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<td><strong>Abstract:</strong> The Asian citrus psyllid (Diaphorina citri; ACP), a vector of the pathogen that causes Huanglongbing (HLB) disease, is one of the most significant pests of California citrus. Areas where both the vector and disease have invaded, such as Florida and Brazil, have suffered devastating losses to their citrus industries. The psyllid arrived in California in 2008 and the pathogen is rapidly spreading northward in Mexico, threatening citrus in California. In Florida, retail nurseries were responsible for rapid spread of both ACP and HLB. To avoid this situation in California, a well-defined ACP management plan for nurseries is needed. The proposed project will target ACP in retail nurseries through monitoring, evaluation of chemical control effectiveness, evaluation of nursery practices, and extension education to nursery employees. The results of this work are of value to retail and production nurseries, nearby commercial citrus and residents, and state regulators.</td>
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<th>Regents of University of California, Riverside</th>
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<td><strong>Title:</strong> Develop management strategies by investigating the mechanisms of pathogenesis and natural defense responses of citrus greening (HLB)</td>
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<td><strong>Abstract:</strong> Huanglongbing (HLB) is one of the most devastating diseases of citrus. So far, no cure for HLB has been found and the mechanisms of its pathogenesis and host responses are hardly known. Plant immunity is regulated by small RNAs and regulatory genes. Preliminary data revealed induction of miRNA399 in response to HLB, suggesting phosphorus deficiency in HLB plants. University of California, Riverside (UCR) proposes to test various solutions that can alleviate HLB symptoms. Recent screening of citrus species discovered that trifoliate orange (P. trifoliata) and some of its hybrids are among the best for HLB resistance/tolerance. UCR will perform comparative analysis of small RNAs and mRNAs from tolerant US-942 (C. reticulata x P. trifoliata) and susceptible Cleopatra (C. reticulata), and identify components that regulate HLB resistance/tolerance. The outcome of this project will help understand the mechanisms of host natural defense responses against HLB, and develop HLB control strategies and HLB tolerant/resistant varieties.</td>
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<th>Regents of University of California, Riverside</th>
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<td><strong>Title:</strong> Development of a biological control agent for snail and slug pests of nursery plants in California</td>
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<td><strong>Abstract:</strong> Snails and slugs are among the most important pests attacking California specialty crops such as nursery plants. Current control options are impractical for large areas or cause damaging non-target effects. There is an urgent need for an alternative strategy such as bio control. In this project, pest gastropods collected in California nurseries will be screened for arthropod and nematode natural enemies. Since European species comprise the main element of this pest fauna, parasitoids of key species will be collected in Europe. Host acceptability, specificity and rearing potential of the most appropriate natural enemies will be determined and the bio control potential of the most efficacious agents will be tested in preliminary release trials in quarantine. Field release trials will take place with the most efficacious and safe agent with the aim of providing an agent for use in California nurseries. This agent will increase the competitiveness of the state's nursery industry.</td>
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<th>U.S. Dept. of Agriculture, Agricultural Research Service</th>
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<td><strong>Title:</strong> Improved diagnostics for Phytophthora plant pathogens important to California Agriculture</td>
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| **Abstract:** Plant pathogens in the genus Phytophthora can have a significant impact on a wide range of California specialty crops either by their direct effect on reducing plant yield or indirectly with regulatory
restrictions on the movement/shipment of plant material intended to prevent pathogen introduction or spread. Current detection techniques do not adequately fulfill the need for sensitive, accurate, rapid and cost effective detection of these pathogens. This proposal will address this by expanding a current research project on molecular detection of Phytophthora spp. using real time Polymerase Chain Reaction (PCR) to include next generation techniques that will require less technological sophistication and expense to run. The California Department of Food and Agriculture (CDFA), Plant Pest Diagnostic Center will be a partner in this project to allow validation of the techniques with real-world plant samples and ensure technology transfer. Techniques and supporting data will also be posted on a website to facilitate technology transfer to a wider audience.

U.S. Dept. of Agriculture, Agricultural Research Service $129,000

Title: Identification and development of Olive Knot Resistant olive cultivars for commercial production in California

Abstract: Olive knot disease caused by the bacterium Pseudomonas savastanoi pv. savastanoi causes significant losses to olive production in California where disease severity is greatest in the northern part of the state where higher rainfall promotes disease development. Olive knot disease is increasingly more important due to increased plantings of susceptible cultivars and the introduction of high-density olive plantings combined with mechanized cultural practices. All these activities dramatically enhance disease development. Currently there are limited disease management strategies which leave the State’s olive crop vulnerable. One of the most cost effective disease control strategies for any plant disease is the identification and use of disease resistant host genotypes. This project proposes to exploit the olive germ plasm collection to identify olive knot resistant selections which will then be used to develop commercially viable olive knot resistant olive cultivars.

U.S. Dept. of Agriculture, Agricultural Research Service $225,019

Title: Detection and quantification of pathogenic Pythium species in Calla lily soils

Abstract: In Monterey and Santa Cruz counties of California, hybrid calla lilies are planted each year using true seed, which is the start of a 2-year crop. Cut flowers are harvested during the growing season and the rhizomes are harvested following the second season. The wholesale value of this crop has decreased from more than $330 million in 2004 to $286 million in 2010. This is partly due to the susceptibility of the calla lily to soil borne pathogens that limit its production and lower the quality of its rhizome. The primary pathogen is known to be a species of Pythium, however, an effective method for detection and quantification of the pathogen not been developed yet. The goal of this project is to develop effective method(s) for detection and quantification of pathogenic Pythium species. It is anticipated that the method(s) will help growers avoid crop losses due to the pathogens and reduce fumigant applications.

U.S. Dept. of Agriculture, Agricultural Research Service $298,648

Title: Creating New Weed Management Tools for Lettuce and Spinach Production in California

Abstract: California produces about 80% of the lettuce and 70% of the spinach in the U.S., valued at $2.2 billion and $257 million in 2010. Weeds in leafy vegetables increase production costs and reduce yields and quality; sometimes resulting in 100% yield loss. Lettuce and spinach growers in California have one or two key herbicides for each crop, and these old herbicides have low sales volumes but high regulatory costs for registrants to keep selling them. The loss of pronamide registration for leaf lettuce in 2009 has increased production costs by over $200/acre. The U.S. Department of Agriculture, Agricultural Research Service (USDA, ARS) will create sustainable weed management systems by developing herbicide-tolerant lettuce and spinach germ plasm through conventional breeding, which has been done successfully in corn, rice, sunflower, and wheat. This project will provide efficient and much more effective weed
control tools than growers have now, and improve the profitability and sustainability of lettuce and spinach production in California.

**U.S. Dept. of Agriculture, Agricultural Research Service, Western Regional Research Center**  
*Title:* Rapid, non-invasive, and early warning detection of mycotoxigenic aspergilli on almonds and pistachios in holding, storage, and transit using hand portable Gas chromatography–mass spectrometry (GC-MS)

**Abstract:** Aflatoxin contamination of almonds and pistachios results in millions of dollars of lost product annually. Aflatoxins are metabolites produced by Aspergillus flavus and A. parasiticus, ubiquitous fungi of CA tree nut orchards, and represent a grave food safety problem due to their carcinogenic attributes. Current methods of analysis are time consuming, expensive and destructive. An air sampling/probe device will be developed to collect the volatile emissions of nut samples without requiring the destruction of the product and provide results in near real-time. The air sampling method will allow for transfer of the volatile compounds directly to a hand portable GC-MS instrument for onsite analysis. The sophisticated software on the GC-MS instrument will allow for determination of target compounds even in cases where there are other interfering volatiles. The portable GC-MS system will use modified hardware specific for this application and developed under this project proposal.

**U.S. Dept. of Agriculture, National Wildlife Research Center**  
*Title:* Assessing increased efficacy of rodenticide baits containing metabolic inhibitors

**Abstract:** This proposal tests additives to anticoagulant bait formulations for the control of anticoagulant resistant voles. Continued used of anticoagulant rodenticides has resulted in rodent populations that are resistant to anticoagulant compounds. These resistant rodents have increased metabolism of the anticoagulant compounds. The additives are inhibitors of metabolism and therefore make the resistant animals susceptible to anticoagulants again. The palatability of additives will be determined using wild trapped rodents. The efficacy of anticoagulant bait formulations with the additives will be determined. Finally, field studies will be performed to determine field efficacy of new formulations.

**U.S. Dept. of Agriculture, National Wildlife Research Center**  
*Title:* Improved diagnostics and quantification assays for Verticillium species important to California Agriculture

**Abstract:** Members of the fungal genus Verticillium can be particularly devastating for California (CA) specialty crop growers due to their broad host range and ability to survive in the soil for long periods of time. Current techniques for quantifying inoculum in the soil are not optimal for a variety of reasons; including the length of time it takes to get results. The availability of a rapid and accurate molecular technique would improve the ability of growers to evaluate the risk of planting susceptible crops early in the decision making process. To address this need for V. dahliae, an accurate and rapid molecular soil quantification assay was developed and validated with field soil samples. Markers were also developed for detection of several other Verticillium species and data collected to design markers for additional species. This project will complete the work and field validate these markers for soil quantification assays that growers can use to accurately assess the disease risk.