2009 Annual Report

Plant Health and Pest Prevention Services

www.cdfa.ca.gov/phpps

Welcome to

PLANT HEALTH AND PEST PREVENTION SERVICES!

Photo Credit: CDFA Crop Tour

INTRODUCTION

The California Department of Food and Agriculture's Plant Health and Pest Prevention Services Division's (PHPPS) mission is legislatively mandated and clearly articulated within the California Food and Agricultural Code, as follows:

Mission — To protect California from the damage caused by the introduction or spread of harmful plant pests.

The California Legislature, enacting this mandate, also recognizes that pest prevention is uniquely positioned to protect California's urban and natural environments as well as its agriculture. It specifically instructs the Department to protect ornamental and native plantings as well as agricultural crops from the harm caused by exotic pest invasions.

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ADMINISTRATION

The PHPPS Division Administration is charged with carrying out the mission. The Division has translated this mission into the following Strategic Vision and Tactical Goals. In California, a series of federal and state plant quarantine laws and regulations are enforced to restrict the entry and movement of commodities capable of harboring targeted plant pests and enable our eradication and control efforts. This approach of prohibiting or restricting the movement of plants, plant products or other commodities capable of harboring exotic plant pests is done in the interest of food security. In this case, the public insurance of a safe and secure supply of food and fiber is based on the premise that it is more economically and environmentally sound to prevent the entry and establishment of dangerous plant pests than to live with them.

Strategic Vision — To provide leadership of pest prevention and management programs that effectively protect California's agriculture, horticulture, natural resources, and urban environments from invasive plant pests, and **protect and ensure quality agricultural crop production.**

Tactical Goals — To prevent the entry, spread and establishment of invasive plant pests that could be detrimental to the State's agriculture, public or natural resources by:

- Accurate and timely pest identification
- External and internal exclusion activities designed to prevent pest entry or establishment
- Early detection of plant pests before they become well established
- Timely and effective eradication actions to eliminate new pest infestations
- Control and containment systems for plant pests that have become widely established
- Research, information technology and pest risk analysis systems to assure that the pest prevention program is relevant, scientifically based and continuously improved
- Maintain outreach programs to enlist public support of pest prevention activities through enhanced public awareness and education
- Development of division employees, foster teamwork and a sense of accomplish ments, and an enjoyable work place

Values — The PHPPS Division Administration encourages all branches and personnel to achieve the Division Mission, Strategic Vision, and Tactical Goals while adhering to the following core values:

- Leadership: Provide clear direction, guidance and support
- Communication: Open, constructive exchange of ideas, opinions and information
- Decision: Decision-making based on the best available science, technology and common sense
- Team Work: Accomplishing division goals through the cooperative efforts of each of our employees
- Credibility: A team that maintains the division as a responsive, accountable and trusted organization
- Development: Maintain a system that develops employees, expands capabilities, acquires and utilizes accurate information and new technologies, while employing innovative pest prevention strategies

The PHPPS Division works with national and international partners to achieve its Mission, Strategic Vision and Tactical Goals; in particular, along with the United States Department of Agriculture (USDA), the division actively participates in the development of standards for pest prevention under the International Plant Protection Convention. The PHPPS Division is also a sustaining associate member of the North American Plant Protection Organization (NAPPO), a regional trade organization that develops pest prevention standards for the three country members — the U.S., Canada and Mexico. California industry representatives are active participants in NAPPO panel committees and its Industry Advisory Group.

STRATEGIC SERVICES UNIT

The PHPPS Administration's Strategic Services Unit (SSU) is responsible for all aspects of the Division's primary administrative services functions. Responsibilities include budget administration, personnel management and position control, contracts and purchase order review, administering the out-of-state travel process, federal funds management, coordination of exam requests and training. The SSU provides recommendations and advice to PHPPS managers and staff on a broad spectrum of administrative and program-related problems and projects. The SSU conducts special administrative assignments at the direction of the Division Director and Assistant Director and develops and implements processes, procedures and program alternatives in order to streamline and improve efficiencies within the Division.

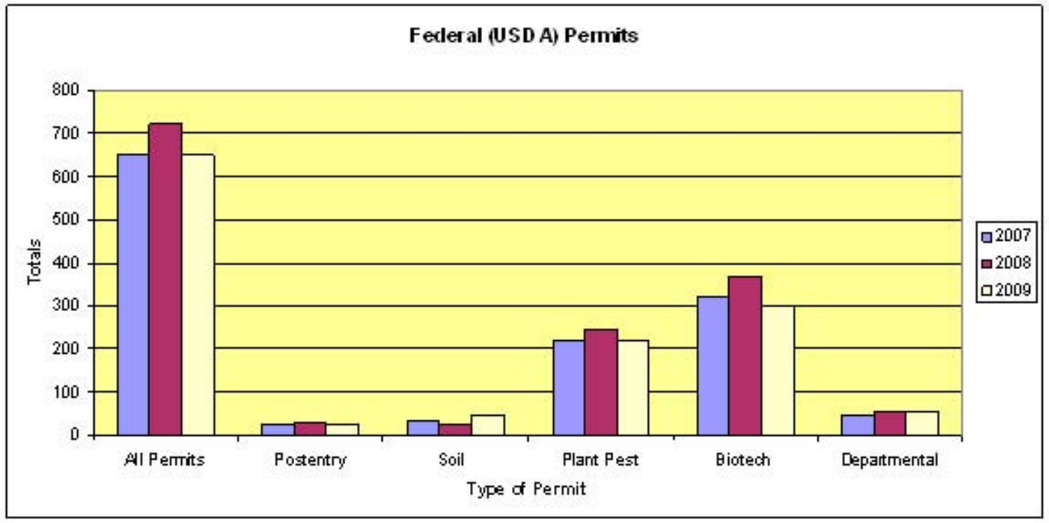
PERMITS AND REGULATIONS

The permits and regulations program develops all regulations administered by the Plant Health and Pest Prevention Services Division (PHPPS) and develops associated legally required documents such as notices, statements of reason, orders and certificates of compliance. The Special Assistant serves as regulatory coordinator for the Division and technical staff assistant to the Director.

This program issues state permits involving agricultural pests, approved laboratories, soil and quarantine commodities as authorized under administrative regulations and the Food and Agricultural Code. In addition, this program approves or disapproves applications for federal permits that are issued by the USDA. These permits concern movement into California of foreign and domestic plant pests, foreign soil, foreign postentry quarantine plant material, genetically-engineered organisms (biotechnology permits), and foreign plants and plant products normally prohibited (departmental permits) entry into the United States. This is the third year since the USDA implemented its new web-based electronic permitting system (ePermits). The state concurrence process is also handled via the Internet for plant pest, biotechnology, soil, postentry quarantine and departmental permits.

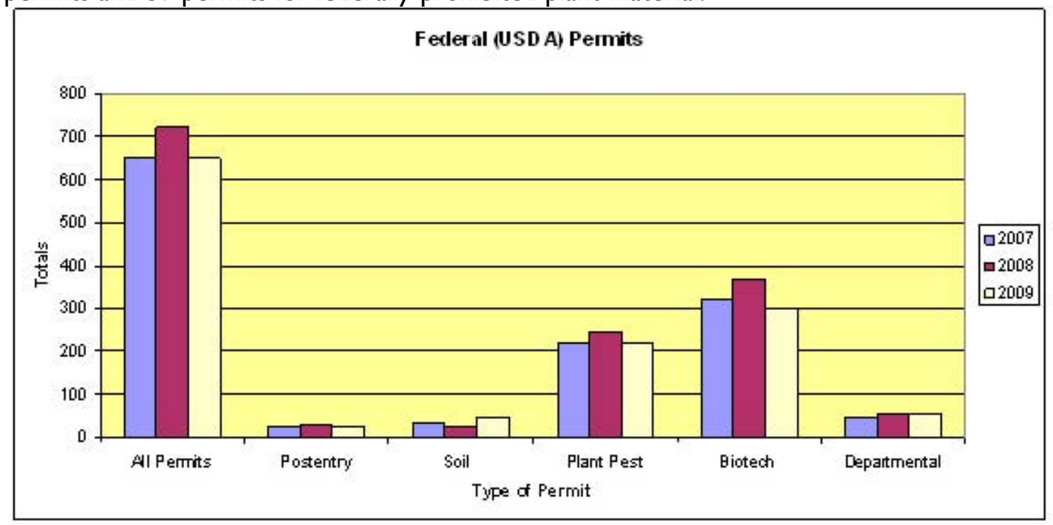
STATE PERMITS

There were 362 state permits issued, consisting of 107 plant pest permits (51 for pathogens and 56 for arthropods), 243 quarantine commodities permits, nine biotechnology movement authorizations and three approved laboratory permits.



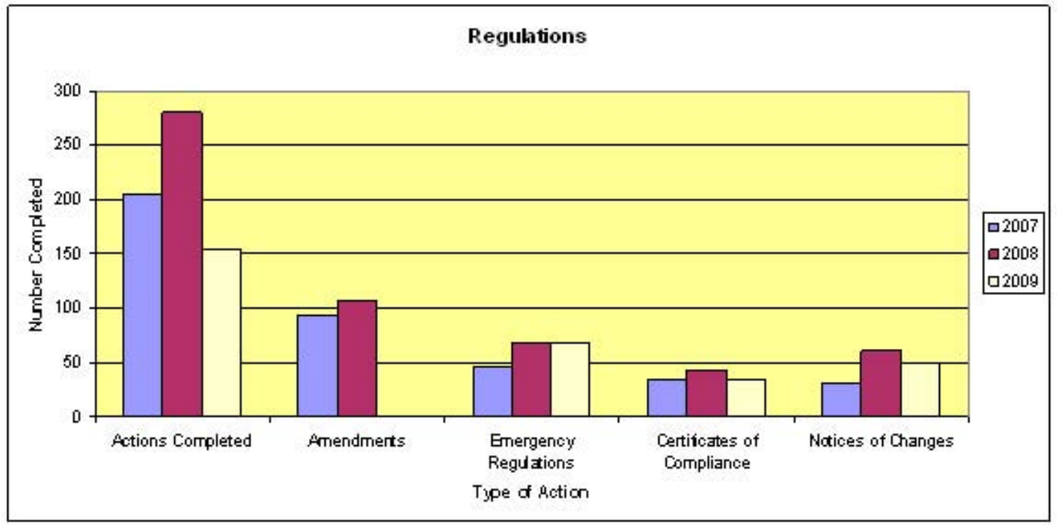
FEDERAL (USDA) PERMITS

A total of 648 applications for federal permits were reviewed and processed including 26 postentry quarantine agreements, 46 soil permits, 222 plant pest permits, 297 biotechnology permits and 57 permits for federally-prohibited plant material.



REGULATIONS

There were 154 regulatory actions, including: 69 emergency regulations, 34 certificates of compliance, 49 notices of changes in the regulations, one order and one Section 100 (data not shown).



BRANCH SUMMARIES

The **PHPPS Division** is comprised of five branches and is responsible for protecting California's agriculture and natural resources against damage caused by exotic and recently introduced plant pests. It provides protection through a comprehensive pest prevention system. Four organizational branches administer the system: Pest Exclusion, Pest Detection/Emergency Project, Integrated Pest Control and the Light Brown Apple Moth Program. These branches receive professional support by the scientists in the Plant Pest Diagnostics Center.

The **Pest Exclusion Branch (PE)** is considered the first line of defense. The mission of the PE is to keep exotic agricultural and environmental pests out of the State and to prevent or limit the spread of newly discovered pests within the State. To accomplish this mission, PE has two roles: 1) quarantine regulatory compliance and enforcement and 2) service to the agriculture industry and the public. PE is divided into three program components: Interior Pest Exclusion (enforcement of quarantines, phytosanitary certification of exports), Exterior Pest Exclusion (border stations) and Nursery, Seed and Cotton (licensing, pest cleanliness, registration and certification, truth in labeling for seeds and quality cotton).

The **Pest Detection/Emergency Projects Branch (PD/EP)** is responsible for the early detection and prompt eradication of serious exotic agricultural pests. PD/EP accomplishes its mission by conducting a statewide trapping program, staffed by county and state inspectors, for exotic insect pests, by implementing special surveys for significant agricultural pests and plant diseases for which traps are not available and by providing emergency eradication services using the best available technology. PD/EP also operates the CDFA Fruit Fly Rearing Facility, located in Waimanalo, Hawaii, which provides high-quality, sterile Mediterranean fruit flies for eradication projects in California. Maximum production can reach up to 136 million pupae per week.

The **Integrated Pest Control Branch (IPC)** conducts a wide range of pest management and weed eradication projects in cooperation with growers, agricultural commissioners and federal agencies. IPC manages biological control and vertebrate pest management functions. Assessments and fees are collected for some program activities and services. IPC contracts with counties, federal agencies, other California state agencies, research agencies and private businesses for various program components. Activities of five projects are coordinated through recommendations of three boards: Pink Bollworm, Beet Curly Top Virus and Tristeza, and two committees: Noxious Weed Management Oversight Committee and Vertebrate Pest Control Research Advisory Committee.

The **Light Brown Apple Moth Program (LBAM)** is a federal and state cooperative program that coordinates with the county agricultural commissioners, other state and local agencies, industry and agricultural organizations throughout the State. The goal of the program is to minimize the statewide impact of light brown apple moth (LBAM). The program's strategy is to contain, suppress and eradicate LBAM while simultaneously developing other mitigation tools, such as male moth attractant treatments, sterile insect release technology and biological control organisms.

The **Plant Pest Diagnostics Center (PPDC)** provides professional plant pest diagnostics support for CDFA's agricultural plant pest prevention regulatory programs, the United States Department of Agriculture, county departments of agriculture, universities, phytosanitary certification of California export products, other state agencies and the general public. PPDC consists of five laboratories including: botany, entomology, nematology, plant pathology and seed taxonomy and germination.

Welcome to

PEST EXCLUSION BRANCH

Detection Dog Chelsea

INTRODUCTION

The Pest Exclusion Branch is a part of California's pest prevention system, and has the following overall objective and vision:

Objective and Vision — To serve the citizens of California by preventing the entry and spread of harmful pests and ensuring the availability of high-quality commodities for consumers worldwide.

BRANCH BACKGROUND

The Pest Exclusion Branch is the cornerstone of CDFA's pest prevention system. The Branch is charged with preventing the introduction and spread of damaging and invasive plant pests into California.

The primary responsibilities of the Branch are to keep serious pests out of the State and to prevent or limit the intrastate spread of newly discovered pests. The Branch is responsible for: exclusion of serious agricultural pests, prevention or delay of the spread of serious pests within the State which have become established or which are being subjected to eradication, suppression or intensive control measures; phytosanitary certification of agricultural commodities for export to other states and foreign countries; assuring that nursery stock meets specified standards; registration and certification of avocado, caneberry, citrus, deciduous fruit and nut trees, garlic, grapevine, seed potato, and strawberry plant nursery stock for farm planting; assuring that seed meets labeled statements as to germination and purity, is free from noxious weed seeds, and properly labeled as to seed treatments if treated; assuring that all cotton grown in the San Joaquin Valley meets criteria established in the Joaquin Valley Quality Cotton Act; coordination of the enforcement of the California Desert Native Plants Act; investigations of agricultural commodity smuggling; and education of the traveling public about California plant quarantine laws.

Key Highlights in 2009

- From late August through November, the Interior Pest Exclusion Program, with assistance from border protection station staff, provided emergency quarantine responses to a series of expansions to the Asian citrus psyllid quarantine area covering the entire counties of Los Angeles and Orange, portions of San Bernardino, Riverside and San Diego counties, while simultaneously providing emergency quarantine responses to the Mediterranean fruit fly quarantines in the Escondido and Fallbrook areas of San Diego County.
- The Senate Bill 140 was signed into law thereby providing the Nursery Program with the authority and responsibility for implementing a mandatory citrus nursery stock cleanliness program.

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EXTERIOR PEST EXCLUSION

Since 1923, the California Department of Food and Agriculture (CDFA) has maintained agricultural inspection stations to inspect vehicles and commodities to ensure they are pest free and meet plant quarantine entry requirements. Today, the Exterior Pest Exclusion Program operates 16 inspection stations, known as Border Protection Stations (BPS), on the major highways entering California. These stations play an integral role in CDFA's efforts to exclude exotic invasive species from the State. Personnel at the BPS perform the following functions:

- Enforcement of federal and state plant quarantine laws and regulations.
- Inspection of vehicles and commodities to ensure freedom from exotic invasive species, including animals, weeds and pathogens.
- Taking control of high-risk shipments which cannot be inspected at the border by forwarding them to destination for inspection.
- Collection, analysis, and dissemination of data pertaining to commodity movement, pest interceptions and traffic flow.
- Increasing public and industry awareness about the importance in preventing the movement and spread of exotic invasive species.

Additionally, the program has cooperative relationships to assist with many regulatory agencies and programs within and outside CDFA. A few of these include:

- CDFA — Animal Health Division
- CDFA — Inspection Services Division
- USDA — Animal and Plant Health Inspection Services
- The California Department of Fish and Game
- The California Highway Patrol

Winterhaven Station c. 1927

Winterhaven Station Today

(BORDER PROTECTION STATIONS)

PRIVATE VEHICLE INSPECTIONS

In 2009, 25.6 million private vehicles entered California through the BPS. Of these, 2.4 million were determined to be high-risk and given detailed inspections. From these vehicles, 73,873 lots of plant material were rejected because they were either in violation of plant quarantine regulations or infested with pests. Inspection of rejected materials yielded 7,244 pest samples submitted for identification; of these, 2,368—an increase of 35 percent compared to 2008—were determined to be pests of concern to California.

Private Vehicle Interception Highlights

Chili Thrips

Chili Thrips: Chili Thrips is an invasive insect originally from Asia and recently introduced into the southeastern United States. It can infest and severely damage over 150 different plant species including asparagus, citrus, figs, grapes, strawberries and tomatoes. This pest was intercepted on guava fruit from Texas in a private vehicle at the Needles Inspection Station.

Invasive Weeds: Thirty-two (32) different species of invasive weeds of limited distribution or not known to occur in California were intercepted from private vehicles on 77 separate occasions—representing a 57 percent increase over the 2008 total. Species included: Diffuse knapweed, spotted knapweed, Scotch thistle, musk thistle, halogeton and Mediterranean sage.

In one instance, during a routing automobile inspection, several bags of aquatic plant material were detected. The interception included four species of invasive aquatic weeds (water lettuce, duckweed, eel grass and water milfoil). They were being transported from Texas by a hobbyist to plant in his backyard pond in southern California.

Also of note were four interceptions of meadow knapweed (*Centaurea monktonii*). This invasive weed has outcompeted native species in several areas of the Pacific Northwest, overgrowing acres of forest and ranchland. These finds were all made at the Redwood Highway station in small shipments of hay with livestock from southern Oregon. These interceptions mark the first occurrences of this weed being intercepted at a border protection station.

Meadow knapweed growing in a southern Oregon field

EXTERIOR PEST EXCLUSION

Cereal Leaf Beetle

Cereal Leaf Beetle: Cereal leaf beetle (Oulema melanopus), a serious pest of grain, was intercepted from plants being transported in private vehicles three times in 2009. These interceptions marked the first occurrences of cereal leaf beetle being intercepted from private vehicles at a border protection station. The specimen shown here was found at the Hornbook Station on ornamental grass plants being transported to Stockton along with personal belongings in a U-Haul.

Wood-Boring Pests: In cooperation with the U.S. Forest Service and the California Department of Forestry, special training on firewood inspection techniques was provided to BPS staff in order to improve their ability to detect wood-boring insects. Invasive wood-boring pests like the Emerald Ash Borer and the Asian Longhorn Beetle can kill or severely injure many types of native tree species and valuable landscape tree species. As a result of the special training, wood-boring pests were intercepted 143 times from firewood transported in private vehicles. This number included: 83 longhorned beetles (family: Cerambycidae); 49 metallic wood-boring beetles (family: Buprestidae); 10 bark beetles (family: Scolytidae); and one horn-tailed wasp (family: Siricidae).

An inspector at the Truckee Station splits firewood to check for insects.

Longhorned beetle larva found in ash firewood from Maine.

The longhorned beetle larvae pictured here were found burrowing inside ash wood from Maine inside a U-Haul trailer at the Truckee Station. The owner was moving to Placerville and had "thrown a few pieces of firewood in because he had extra room on the trailer."

(BORDER PROTECTION STATIONS)

In another instance, over 100 pounds of mesquite wood from Texas was being transported in a pickup to San Bernardino through the Needles Station. Inspection revealed eight different species of insects, including longhorned and metallic wood-boring beetles.

Summary of Actionable Pests Intercepted from Private Vehicles in 2009

Type	Occurrences
Homoptera (scales, mealybugs, leafhoppers, whiteflies), including: Magnolia white scale, citrus snow scale, wax scale, palm mealybug, etc.	857
Diptera (flies), including: Walnut husk maggot, cherry fruit fly, apple maggot, etc.	298
Coleoptera (beetles), including: Japanese beetle, cereal leaf beetle, pecan weevil, long-horned beetles, etc.	255
Mollusks (snails and mussels), including: Quagga mussel, zebra mussel, false dark mussel, bradybaena snail, etc.	253
Animals, including: Ferrets, gerbils, quaker parrots, etc.	168
Hymenoptera (ants), including: Imported fire ant, white-footed ant, Florida carpenter ant, etc.	149
Lepidoptera (moths), including: Gypsy moth, European corn borer, hickory shuckworm, false codling moth etc.	78
Thysanoptera (thrips), including: Chili thrip, eastern flower thrip, etc.	78
Weeds, including: Russian knapweed, diffuse knapweed, Canada thistle, Scotch thistle, hoarycress, etc.	77
Hemiptera (bugs), including: Chinch bug, cotton stainer, etc.	47
Other Insects and mites	113
Total	**2,368**

COMMERCIAL VEHICLE (TRUCK) INSPECTIONS

Commercial Vehicle Inspections

In 2009, 7.38 million commercial trucks entered California through the BPS. Of these, 553,439 were determined to be high-risk and were given detailed inspections, 3,054 were rejected because they were either in violation of plant quarantine regulations or infested with pests, and 25,548 were forwarded to destination for more detailed inspection by county agricultural commissioners' staff.

EXTERIOR PEST EXCLUSION

Commercial Shipment Dispositions by Commodity Type			
Commodity	Inspected and Released	Sent to Destination Under Hold Notice	Rejected Because of Pests or Lack of Certification
Produce (fresh fruits and vegetables)	384,896	82	1,819
Nursery Stock	9,060	10,238	644
Other Plant Material (cut greens, Christmas trees, etc.)	63,992	315	751
Seed	2,819	8,728	54
Feed Grain	4,464	31	16
Hay	56,853	3	79
Apiary (bee colonies)	844	3,021	129
Household Goods	37,956	2,840	137
Total	560,884	25,258	3,629

Commercial Produce Regulatory Sampling

To verify that fruits and vegetables subject to state and federal quarantines have been properly treated for exotic fruit flies and other pests, commercial shipments of many commodities including citrus, mangos, and cherries are randomly inspected to ensure they are free of pests. In 2009, 44,251 lots were sampled. Of these, only one shipment (a shipment of cherries from Utah infested with cherry fruit fly, *Rhagoletis indifferens*) was found to be infested. Random verification inspections by the BPS provide a deterrent to commercial smuggling and help ensure that required quarantine treatments are properly conducted in other states and countries.

Commercial citrus fruit being sampled at the Blythe Station

Inspecting a truckload of spruce trees at the Hornbrook Station.

(BORDER PROTECTION STATIONS)

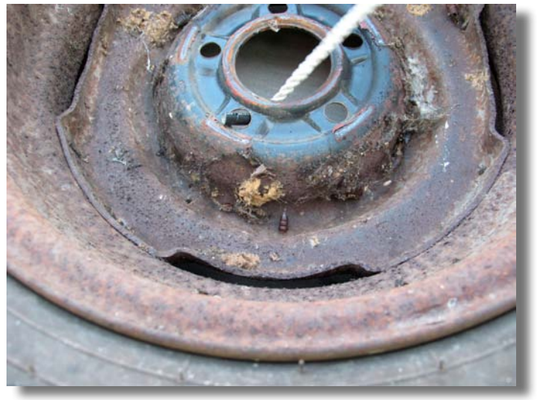
Pest Interception from Commercial Shipments

All commercial shipments of plant material and conveyances, even those not subject to state and federal quarantines, are inspected to ensure that they are not infested with pests. During the course of inspecting commercial shipments, 1,024 pests were intercepted. Each of these detections resulted in the rejection of the shipment or conveyance until the infestation was eliminated (i.e., fumigation, cleaning, etc.). The table below illustrates the interceptions by type of pest.

Commercial Vehicle Pest Interception Highlights

Gypsy Moth: During an inspection for aquatic pests, gypsy moth egg masses were found on the spare tires of a boat trailer hauling a 40' sailboat from Massachusetts at the Needles Station. The tires were pressure washed and released.

An inspector uses a creeper to check the underside of the trailer



Gypsy moth eggs and pupae on trailer wheel

Sweet Potato Weevil: The Blythe station intercepted a shipment of 50 cartons boniatos (sweet potatoes) from Florida destined to the Los Angeles Produce Market. Inspection revealed that the shipment was heavily infested with eggs, larvae, pupae and adult sweet potato weevil (*Cylas formicarius*). The shipment was returned to origin.

Adult Sweet Potato Weevil

EXTERIOR PEST EXCLUSION

Perennial Sow Thistle Seeds

Weeds on unusual hosts: Typically invasive weeds are found in commercial shipments of hay or grain; however, occasionally they are found by alert inspectors on machinery, in bee colonies, and on farm equipment. For example, inspectors at the Needles Station found perennial sow thistle (Sonchus arvensis) on an open-aired pump hauled on a flatbed trailer from Quebec, Canada, destined to Los Angeles. The pump was released after the weed contamination was released.

Summary of Actionable Pests Intercepted from Commercial Vehicles in 2009	
Type	Occurrences
Homoptera (scales/mealybugs), including: Lesser snow scale, magnolia white scale, palm whitefly, striped mealybug, etc.	511
Hymenoptera (ants), including: Imported fire ant, white-footed ant, Florida carpenter ant, etc.	117
Weeds, including: Musk thistle, Scotch thistle, diffuse knapweed, spotted knapweed, etc.	126
Coleoptera (beetles), including: Japanese beetle, May beetle, long-horned beetles, etc.	67
Lepidoptera (moths), including: Gypsy moth, false codling moth, hickory shuckworm, pickleworm, etc.	50
Mollusks (snails and mussels), including: Quagga mussel, zebra mussel, banded wood snail, bradybaena snail, etc.	22
Thysanoptera (Thrips), including: Chili thrip, cotton bud thrip, eastern flower thrip, etc.	19
Hemiptera (bugs), including: Brown marmorated stinkbug, chinch bug, etc.	13
Diptera (flies), including: Mexican fruit fly, cherry fruit fly, etc.	20
Other Insects and mites	79
Total	1,024

INTRA- AND INTER-AGENCY COOPERATIVE ACTIVITIES

Quagga/Zebra Mussel Inspections

The BPS continued to play a key role in the multi-agency effort to prevent the introduction of quagga and zebra mussels into California through the transport of infested watercraft. To prevent the introduction of invasive mussels, the BPS staff inspect the exterior surfaces (i.e. hull, motor, trailer) of watercraft for adult mussels and ensure that the watercraft is free of standing water that can harbor the microscopic larval form of these pests.

(BORDER PROTECTION STATIONS)

Quagga Mussels clinging to weed debris found on boat trailer at Vidal Station

The BPS inspected 159,581 watercraft. Of these, 9,245 (about 5.8 percent) either had adult mussels clinging to the exterior surfaces or were carrying standing water. All boats with standing water were drained at the stations; those with adult mussels were cleaned at the station and sent on to destination under quarantine restriction for additional, more detailed inspection by California Department of Fish and Game (CDFG) staff.

Board of Equalization Use Tax Collection Pilot Program

In conjunction with the Board of Equalization (BOE), a program to assess the level of use tax compliance is being conducted at the Needles BPS. This program began in July 2006 and has been extended through July 2010. Needles BPS personnel have been trained to identify and collect information on commercial shipments of commodities that are subject to the use tax. Information on these shipments is provided to BOE in order to determine if appropriate taxes have been paid. In the 2009/10 fiscal year, this program is projected to collect $8.9 million use tax and penalties that otherwise might not have been recovered.

Game Importation Declarations

Under provisions of the California Fish and Game Code, everyone entering California with fish or game from other states are required to complete a game declaration form. The information from the forms helps the CDFG to identify potential violations of hunting and fishing laws and regulations, including a regulation to prevent the spread of chronic wasting disease. This disease is closely related to mad cow disease and affects and kills deer and elk in several other states. To assist the CDFG, the BPS inform people entering the state with fish and game about the law, provide them the form and remit the completed forms to CDFG. BPS staff remitted 63,406 game declaration forms to the CDFG.

An inspector assists a hunter with a game declaration at the Dorris Station

Livestock Tracking

To assist CDFA's Animal Health Branch in tracking animal ownership and disease outbreaks, BPS recorded all shipments of livestock entering California. 40,291 shipments were recorded.

Market Egg Shipments

To assist the Egg Quality Control Program in ensuring quality standards are met and appropriate mill fees are paid, BPS record all shipments of market eggs entering from other states. 12,712 shipments were recorded.

INTERIOR PEST EXCLUSION

The Interior Pest Exclusion Program serves the citizens of California by working toward two goals:

- Preventing the introduction and spread of harmful and invasive plant pests
- Promoting market access for California agricultural products

Pest Prevention

Harmful and invasive exotic pests threaten California's agricultural industry. Pests can directly damage crops by stunting growth, diminishing quality or invading croplands and irrigation systems. Pests can indirectly affect crops by causing unsightly damages that reduce marketability or by restricting exports to countries that impose quarantines on areas where pests are established. To protect California's agricultural interests from these and other consequences of non-native plant pests, the Interior Pest Exclusion Program works within the pest prevention system to reduce the risk of pests entering the State on infested commodities and to prevent pests that have entered the State from becoming established.

The pest prevention system relies on a combination of strategies to protect agricultural commodities from damaging or invasive species. Two strategies employed by the Interior Pest Exclusion Program, pest prevention and pest containment, are the cornerstones of the pest prevention system. First, the Program prevents the entry of pests on commercial or private shipments of goods by conducting inspections on incoming shipments, enforcing state and federal regulations that pertain to incoming shipments and working with agricultural agencies to enhance origin inspections to achieve pest-free shipments. Secondly, the Program takes immediate action to contain the spread of newly-introduced pests by enforcing regulations that restrict shipments from areas that are newly infested with pests.

Functions of the Interior Pest Exclusion Program are carried out in cooperation with the county agricultural commissioners, the United States Department of Agriculture (USDA) and other state agricultural agencies. The Program works with other state agencies such as the California Departments of Fish and Game, Forestry and Fire Protection, Public Health and Pesticide Regulation to share knowledge and help enforce regulations.

Promoting Exports

To promote California agricultural commodities in foreign and domestic markets, the Interior Pest Exclusion Program maintains a close working relationship with the USDA to facilitate the export of California's products worldwide. Examples of the Program activities that promote California exports include providing up-to-date pest lists requested by interested trade partners and enforcing regulations that limit the spread of newly-infested pests within the state. By restricting shipments from areas of the state known to be infested with pests, non-infested areas are protected from the effects of quarantines imposed by trade partners, thus ensuring continued access to California-produced commodities in the world-wide marketplace.

Interior Pest Exclusion Program Activities Include:

- Quarantine Response
  - Emergency response to a pest infestation
  - Quarantine response to a pest incident
- Quarantine Training, Direction, Oversight and Consultation
- Quarantine Enforcement
- Trade Facilitation
- Commodity Treatment Coordination and Consultation
- Data Collection and Information Management

Following are highlights for 2009:

QUARANTINE RESPONSE

Emergency Response to a Pest Infestation

When a reproductive population of a pest is discovered in California, an infestation is declared. The Interior Pest Exclusion Program responds by enacting emergency pest abatement and control measures to contain the infestation and determine effective commodity host treatments that facilitate movement to market. If the pest is a federal action pest, emergency regulatory responses are coordinated with the USDA. In 2009, emergency responses were conducted for infestations of Asian citrus psyllid, European gypsy moth, Mediterranean fruit fly, Mexican fruit fly, Oriental fruit fly, Mexican fruit fly, white striped fruit fly and sudden oak death.

Asian Citrus Psyllid

Asian citrus psyllid (ACP) is a serious pest of great concern. ACP vectors the disease commonly known as Huanglongbing (HLB), which causes the decline and eventual death of plants that become infected. HLB infects plants in the family *Rutaceae*, including all citrus and several types of ornamental plants.

Asian citrus psyllid was first discovered in California in San Diego County on August 27, 2008, on a yellow panel trap placed in South Bay Terraces, a small community 11 miles north of the Mexican border. A state interior quarantine was declared on September 5, 2008. In October 2008, a portion of Imperial County was declared quarantined but, due to additional new ACP finds in Imperial County and also in the adjoining state of Arizona, the entire Imperial County was placed under ACP quarantine on November 11, 2009.

Because of new finds, the entire counties of Orange and Los Angeles were declared quarantined in August and September 2009, respectively. Further, additional finds of ACP in Pomona in Los Angeles County resulted in encompassing portions of San Bernardino and northwest Riverside County. No ACP was detected in San Bernardino and Riverside counties in 2009.

By the end of 2009, a total of 15,937 square miles was included in the quarantined area in Imperial, San Diego, Orange, Los Angeles, San Bernardino and Riverside counties (see Table 1).

INTERIOR PEST EXCLUSION

Table 1: Asian Citrus Psyllid Quarantine in California in 2009	
County	Quarantine Area (Square Miles)
Imperial**	4,484
Los Angeles**	4,098
San Diego*	3,702
Riverside*	2,205
Orange**	800
San Bernardino*	648
Total	15,937

*Partial county under quarantine

**Entire county under quarantine

The ACP regulation prohibits the movement of ACP host nursery stock (citrus and citrus-related plants) from the ACP quarantined area, and allows movement within the quarantined area only if properly treated for ACP. A total of 809 production nurseries regularly treat and transport treated citrus nursery stock into or within the ACP quarantined area.

Citrus fruit is not regulated by the ACP quarantine, but growers and harvesters of citrus fruit must ensure that harvested fruit and all bins and equipment used to transport citrus fruit is free of all plant parts (stems and leaves) prior to leaving the quarantined area.

By the end of 2009, a total of 4,470 nurseries, growers, harvesters and haulers of citrus fruit and handlers of green waste were identified in the ACP quarantined area and were issued compliance agreements to aid in the enforcement of the quarantine requirements (See Table 2).

Adult ACP
Photo Citation: DavidHall, USDA, AgResearchService, bugwood.org

Table 2: Number of Businesses Regulated for Asian Citrus Psyllid in 2009		
Counties	Regulated Business	Count
San Diego, Imperial, Riverside, San Bernardino, Orange and Los Angeles	Production Nurseries	809
	Growers	376
	Cut Flowers/Cut Greens	420
	Yard Maintenance	892
	Certified Farmers' Market Vendors	1,833
	Harvester	36
	Packer	45
	Processor	2
	Hauler	57
	Total	4,470

European Gypsy Moth

Adult GM male (left) and female (right)

In between the summer and fall of 2008, seven adult European gypsy moths (GM) several egg masses and larval cast skins were discovered in Ojai, Ventura County. The infestation was linked to a recreational vehicle that originated in and entered the State the previous year.

On October 28, 2008, a GM state interior quarantine was established in the Ojai area of Ventura County and continues through 2009. The quarantine covers approximately five square miles. All hosts and possible carriers of gypsy moths (i.e., recreational vehicles, trailers, outdoor household articles, firewood) within the quarantine area must be inspected and certified free of GM life stages prior to leaving any property inside the quarantine area. A total of 36 businesses are affected by this quarantine, including landscaping and tree service companies; green waste transporters; receivers and processors of green waste; lumber storage and transportation companies; nurseries; feed stores; and recreational and commercial equipment rental and storage facilities. The quarantine area is expected to remain in effect until the fall of 2010.

INTERIOR PEST EXCLUSION

Oriental Fruit Fly, Lakewood, Los Angeles/Orange Counties

Oriental Fruit Fly

An Oriental fruit fly state interior quarantine was initiated in August 2008 in Los Angeles and Orange counties after the detection of eight adult flies in the vicinity. The 109 square mile quarantine included the areas of Lakewood, Long Beach, Paramount, Carson, Bellflower, Dominguez Hills, Compton, Norwalk, Cerritos, Rancho Dominguez, Hawaiian Garden, Lynwood, Artesia, Southgate, Signal Hills, Downey, Cypress, La Palma, Seal Beach and Los Alamitos. The quarantined area is primarily an urban area.

Many businesses in the region were affected by the quarantine, including growers, produce markets, wholesale produce distributors, swap meets, certified farmers' markets, nurseries, landscaping companies and others. The quarantine also applied to residents, who were asked not to move any fruits, vegetables or other host material from the area.

Interior Pest Exclusion staff issued 548 compliance agreements to affected businesses. A total of 4,218 pounds of potentially infested host material was seized and destroyed. Project staff supervised 42 pre-harvest bait treatments for cucumbers. The quarantine concluded in June 2009.

Oriental Fruit Fly, La Verne, Los Angeles County

An Oriental fruit fly quarantine was initiated on August 5, 2009, after having confirmed an incipient infestation of the fly in the La Verne area of Los Angeles County. The 84 square mile quarantine includes the areas of La Verne, Glendora, Pomona, Claremont, West Covina, Covina, Walnut and San Dimas. The quarantined area is primarily an urban area mostly residential and commercial.

Project staff has issued a total of 142 compliance agreements to affected businesses which include nurseries, certified farmers' markets, community gardens, yard maintenance gardeners, produce markets, growers, packers and haulers. The quarantine also applies to residents who are asked not to move any Oriental fruit fly host material from the area. The quarantined area is expected to remain in effect until April 2010.

Mediterranean Fruit Fly, El Cajon/Spring Valley, San Diego County

A state interior quarantine for the Mediterranean fruit fly (MDFF) was established in El Cajon on November 26, 2008, after the detection of multiple adults and larva. The initial quarantine encompassed 107 square miles and after additional detections, was expanded to 139 square miles on December 19, 2008. Quarantine areas included portions of Lakeside, Spring Valley and Alpine.

Mediterranean Fruit Fly

In 2009, an additional detection on February 5, 2009, expanded the quarantine further into Spring Valley increasing the quarantine to 198 square miles. An additional fly was found on May 7, 2009, which did not increase the quarantined area. Sterile MDFFs were released each week for two life cycles around each find site to aide in eradication.

Interior Pest Exclusion and project staff issued 317 compliance agreements to nurseries, swap meets, a food bank, certified farmers' markets, yard maintenance companies and fruit sellers. The quarantined area included a 500-acre avocado grove and several small groves of various commodities.

On July 14, 2009, the El Cajon portion of the quarantine was declared eradicated. The remainder of the quarantine, 93 square miles with 186 regulated establishments, was renamed the Spring Valley Mediterranean Fruit Fly Project. This quarantine was declared eradicated on August 23, 2009.

Mediterranean Fruit Fly, Escondido, San Diego County

In September 2009, a MDFF quarantine was established in the Escondido area of San Diego County. Additional fly finds and larval detection in November expanded the quarantined area from 77 to 148 square miles. Project staff have issued 259 compliance agreements and conducted 1,510 inspections of regulated entities, including growers, harvesters, fruit haulers, fruit processors, fruit packers, produce markets, nurseries and yard maintenance gardeners. A total of 354 hold notices were issued to commercial and back yard growers of MDFF host material. Fifty-five growers entered into a pre-harvest bait treatment program. Project staff supervised 216 bait treatments for avocados, cherimoyas, citrus, guavas and persimmons. Over 10,000 pounds of potentially infested host material has been seized and destroyed. Quarantine enforcement activities will continue into 2010.

Mediterranean Fruit Fly, Fallbrook, San Diego County

In late October 2009, two wild male MDFFs were trapped in the Fallbrook/Bonsall area of San Diego County. Two additional flies and 68 larvae were also found. A 79 square mile quarantine was enacted which is in close proximity to the Escondido MDFF quarantine. Both quarantine projects are based in one office and managed with the same staff. Project staff have issued 197 compliance agreements and conducted 839 inspections of regulated entities, including growers, harvesters, fruit haulers, fruit processors, fruit packers, produce markets, nurseries and yard maintenance gardeners. There were also 262 hold notices issued to commercial and back yard growers of MDFF host material. Eighty growers have entered into a pre-harvest bait treatment

INTERIOR PEST EXCLUSION

program for commodities such as avocados, cherimoyas, citrus, guavas and persimmons. A total of 349 pre-harvest bait treatments have been supervised by project staff. Approximately 3,500 pounds of host material has been seized and destroyed due to non-compliance with the quarantine rules and regulations. Quarantine enforcement activities will continue into 2010.

Mediterranean Fruit Fly, Santa Monica, Los Angeles County

In October 2009, three sexually mature females of MDFFs were detected in the Santa Monica area, Los Angeles County. As a result, on November 16, 2009, the Santa Monica MDFF quarantine was declared. The quarantine area is 65 square miles in a primarily urban area. Interior Pest Exclusion and project staff have issued 400 compliance agreements to nurseries, certified farmers' markets, swap meets, food banks and fruit sellers. A total of 130 pounds of potentially infested host material has been seized and destroyed.

Sterile MDFFs are dropped weekly for two life cycles around each find site to aide in eradication. The quarantine is scheduled to end in August 2010.

Mediterranean Fruit Fly, Mira Mesa, San Diego County

On June 1, 2009, a MDFF quarantine was established in Mira Mesa, in the county of San Diego. The quarantine covered approximately 106 square miles in an urban area. Project staff issued 17 Hold Notices, 85 Compliance Agreements to businesses such as produce markets, food banks, a certified farmers' market and nurseries. There were no commercial growers inside the quarantine. No host materials were seized and no Notices of Violation were issued. The quarantine concluded on October 24, 2009.

Nursery stock on hold at a nursery in the quarantine area.

Mediterranean Fruit Fly, Imperial Beach, San Diego County

A state interior quarantine for the MDFF was established in Imperial Beach on August 7, 2009, after the detection of a mated female fly. The quarantine encompassed 37 square miles and included portions of Chula Vista, San Diego and National City.

Interior Pest Exclusion and project staff issued 100 compliance agreements to nurseries, swap meets, a certified farmers' market, yard maintenance companies, fruit sellers/distributors and two small growers. Sterile MDFFs were released each week for two life cycles around the find site to aide in eradication. The quarantine was declared eradicated on January 6, 2010.

Mexican Fruit Fly, Azusa, Los Angeles County

In July 2009, a Mexican fruit fly quarantine, which had been in place since December 2008, was lifted in Azusa, Los Angeles County. The 70 square mile quarantine included the areas of Azusa, Baldwin Park, Irwindale, Covina, West Covina, Duarte, Monrovia, Glendora, La Puente, El Monte, San Dimas and Bradbury. The quarantine area was primarily urban. About 300 businesses were affected and were operating under compliance agreements. Hold notices were issued to four find sites in the area. The avocado growers within the quarantine area harvested Hass avocados and moved them under Limited Permit in accordance with USDA Requirements for Packing Hass Avocados Grown Inside the Quarantine Area. A new Hass Release Protocol was enacted on November 8, 2007, allowing Hass growers to pick their crop without treatment if they followed sanitation and safeguarding requirements.

The quarantine also applied to residents who were asked not to move any fruits, vegetables or other host material from the area.

The quarantine was lifted after three life cycles of the Mexican fruit fly were completed with no new detections.

White Striped Fruit Fly, Los Angeles/San Bernardino Counties

This is the first time that white striped fruit fly (*Bactrocera albistrigata*) has been detected in the U.S. The white striped fruit fly is a known destructive insect pest of several hosts including guavas and mangos. The white striped fruit fly quarantine was established in August 2009 in Los Angeles and San Bernardino counties after the detection of multiple adult white striped fruit flies in the La Verne and San Dimas area of Los Angeles County. The 81 square mile quarantine area included the cities of Laverne, San Dimas, Claremont, Glendora and Pomona of Los Angeles County and a portion of the city of Upland in San Bernardino County.

White Striped Fruit Fly

The quarantined area was primarily residential. There was no commercial production of host plants. Over 72 businesses were affected and included certified farmers' markets, produce markets, fruit sellers, nurseries, landscaping companies and yard maintenance gardeners. Residents of the area were asked not to move fruits, vegetables or other host material from the area. All quarantine activities will be concluded in January 2010.

INTERIOR PEST EXCLUSION

Sudden Oak Death (*Phytophthora ramorum*)

Interior Pest Exclusion has a lead role in administering the Cooperative *Phytophthora ramorum* Quarantine Project. The project is a cooperative effort between state, federal and county agencies for the purpose of enforcing state and federal regulations for *P. ramorum*, the causal agent of sudden oak death (SOD). Interior Pest Exclusion oversees the compliance agreements for the regulated establishments in both quarantine counties (where the pathogen is known to occur in the environment) and in regulated counties, which includes all other counties in the State. Listed below are the types of compliance agreements that were issued and/or monitored in 2009.

Number of Businesses Regulated for P. ramorum in 2009

Counties	Regulated Business	Count
Quarantined	Nursery Stock/Soil of Nursery Stock	263
	Wood and Wood Products	30
	Greenery, Garland and Wreaths	13
	Green Waste Facility/Transporter	155
	Compost Facility	15
	Tree Farm	14
Regulated	Nurseries that ship host material	446
	Nurseries that only ship non-host material	694
Total		1,630

As a component of the enforcement of the *P. ramorum* state and federal quarantines, nurseries are surveyed annually and samples are collected to test for the presence of *P. ramorum*. Surveys are also conducted at source nurseries (trace back) or destination nurseries (trace forward) as part of the investigation process when *P. ramorum* is detected. In 2009, a total of 1,403 nurseries were surveyed and the pathogen was detected at four of the surveyed nurseries (see table below).

Interior Pest Exclusion Activities at Nurseries Where P. ramorum was Detected

Survey	Quarantined Counties	Regulated Counties	Total
Compliance Agreement	2	2	4
Nursery Stock Cleanliness	0	0	0
Trace Forward	0	0	0
Other/Trace Back	0	0	0
Total	2	2	4

Following the detection of *P. ramorum* in a nursery, eradication is initiated by implementing the Federal (United States Department of Agriculture, Animal and Plant Health Inspection Service) Confirmed Nursery Protocol for *P. ramorum*, including the issuance of quarantine hold, delimitation survey, trace forward and trace back investigations and destruction of infected plant(s).

During 2009, over 17,917 samples were collected from nurseries and tested for *P. ramorum* at CDFA's Plant Pest Diagnostics Laboratory. *P. ramorum* was detected in less than one percent (or 17) of the samples. Approximately 29 percent of the detections in nursery samples were taken from three plant types; *Camellia spp.*, *Rhododendron spp.* and *Pieris spp.* Other *P. ramorum*-positive nursery stock included species of the genera *Arbutus, Camphora, Laurus, Leucothoe, Loropetalum, Magnolia* and *Sequoia*.

In July 2009, the United States Department of Agriculture scheduled a *P. ramorum* Program Review in California to ensure that all participating nurseries maintained compliance with the federal regulations. A tour of nurseries in California that ship *P. ramorum* host plants interstate was organized by the Interior Program, and the Interior Program staff provided an overview of the regulatory program, including the inspection and sampling methods, ongoing monitoring methods and actions undertaken if *P. ramorum* is found in a nursery setting.

In August 2009, at the request of the Southern Plant Board, a second tour of nurseries that ship. *P. ramorum* host material interstate was organized by the Interior Program. The purpose of this tour was to provide transparency in the *P. ramorum* regulatory program in California to the Southern Plant Board members. Interior Pest Exclusion Program staff provided an overview of the regulatory program, including the inspection and sampling methods, ongoing monitoring methods and actions undertaken if *P. ramorum* is found in a nursery setting.

Quarantine Response to a Pest Incident

Throughout California, pests may be detected but do not qualify as a trigger for establishing a quarantine. It is essential for such pest incidents to receive immediate quarantine response to prevent the establishment of an infestation. In 2009, quarantine responses were conducted for pest detections of branched broomrape, a Q-rated cerambycid, gladiolus rust, gypsy moth, Oriental fruit fly, guava fruit fly, Mexican fruit fly, peach fruit fly and panicle rice mite.

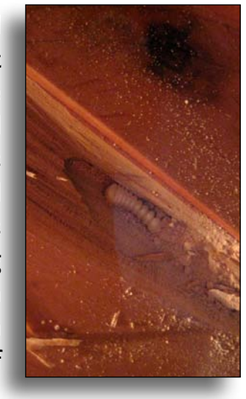
INTERIOR PEST EXCLUSION

Branched Broomrape –Orobanche ramose

Broomrape attacks tomatoes, lettuce, safflower and other crops as well as native plants and weeds. It is a plant parasitic weed and can severely reduce yields. This parasitic weed is listed as a Federal and State Noxious Weed and thus must be eradicated.

On September 4, 2009, CDFA was notified of a possible branched broomrape find in Hollister, California by San Benito County Agricultural Department (County). CDFA notified USDA immediately of this potential noxious weed. The following week, the County and CDFA conducted a delimitation survey on the 871-acre tomato ranch. A plant sample was sent to the CDFA Lab for identification and was confirmed positive for branched broomrape on September 14, 2009. The initial delimitation survey concluded that the infestation was limited to approximately 42 acres in two blocks. After establishing a buffer zone around the infested area, the quarantine area increased to 67 acres and Federal and State Hold Notices were issued to the farming company. On October 6, 2009, USDA, County and CDFA staff conducted a pre-harvest survey of the entire ranch and the farming company was allowed to harvest and ship tomatoes from the portions of the ranch that were outside the quarantined area. Harvest concluded on November 3, 2009, the field was turned over and seed beds were prepared for next season. The equipment that was used in the quarantined area was cleaned and inspected by the County before it was allowed to move out of the area. The USDA is still evaluating long term eradication and control methods for the quarantined area due to the biology (longevity) of this weed seed.

Q–Rated Cerambycid Detection in Alderwood Flooring in San Francisco



On September 21, 2009, CDFA and San Francisco County biologists visited a residence in San Francisco, responding to the homeowner's request for an inspection of alderwood flooring in their kitchen for possible woodborer infestation. Biologists quickly located several exit holes and dug out one live and one dead cerambycid larvae. A Hold Notice was issued and specimens were submitted to the lab resulting in Q-rated cerambycid, possibly Asian long-horned beetle (ALB). Suspicion for ALB was supported by the fact that the wood originated from China. The flooring was sold about a year prior to our inspection by a flooring company in San Francisco that imports flooring from China as well as from other foreign countries. Inspection at this facility was scheduled with participation of state, county and federal agencies. The original alderwood shipment from China had all been sold out and no other customers have reported any problems. Biologists conducted a second inspection at the homeowner's residence to try to find adults to get a proper identification. No adults were found but nine more live larvae were found. A Rejection Notice was issued and the flooring company agreed to remove the flooring and pay for the proper disposal. The removal was performed under CDFA supervision and compromised wood was disposed of following an approved disposal method. Traps have been placed at both the house and at the warehouse of the flooring company and these are now monitored. Surveys around the property are planned. So far the homeowners have reported no further problems.

Gladiolus Rust

Gladiolus rust was found for the first time at a commercial nursery in Santa Cruz County. This rust is caused by a fungus, *Uromyces transversalis*, and it attacks only members of the family Iridaceae. A county inspector first noticed infested gladiolas flowers at the farmers' market and then traced back the gladiolas to a commercial producer. This producer grows various cut flowers as well as fruits and vegetables for local farmers' markets. Santa Cruz County issued a Hold Notice and USDA and County inspectors initiated eradication activities at the producer's site. Two rows of gladiolas (400 feet) were pulled. Subsequently the rows were disked and an estimated 35 pounds of bulbs were collected and together with previously collected bulbs were properly disposed of in a landfill under county supervision. The producer agreed to remain host free for one year. Additionally, a residential survey will be conducted in a one-mile radius around this nursery.

The USDA continues to conduct residential surveys in Bay Area counties.

Gypsy Moth

A Gypsy moth was trapped in the city of Los Gatos in Santa Clara County. A Hold Notice was issued to the property where the moth was trapped and to the adjacent properties in order to stop the movement of potentially infested commodities. Program staff surveyed the area for host material and businesses that would be affected if a quarantine were to be established. Fortunately, the number of moths detected did not trigger a quarantine in this area.

INTERIOR PEST EXCLUSION

Oriental Fruit Fly and Guava Fruit Fly - Los Angeles, Orange, Riverside, San Bernardino, Santa Clara, Sacramento, San Mateo and Ventura Counties

During 2009, Oriental fruit flies were trapped in the cities of: Monrovia, Long Beach, Los Angeles, Santa Clarita, La Verne, Norwalk, Reseda and Temple City of Los Angeles County; Santa Ana and Laguna Niguel of Orange County; Corona of Riverside County; Chino Hills and Rancho Cucamonga of San Bernardino County; Ventura; Santa Clara of Santa Clara County; and Sacramento of Sacramento County.

During 2009, guava fruit flies were trapped in the cities of: Long Beach, Carson, Agoura Hills, Calabasas, El Monte and Bell of Los Angeles County; Santa Ana and Garden Grove of Orange County; Thousand Oaks of Ventura County; and San Mateo of San Mateo County. Hold notices were issued to fly-find properties to stop the movement of potentially infested commodities. Staff surveyed the areas for host material and potentially affected businesses. Fortunately, the number of flies detected in these areas did not trigger quarantines.

Mexican Fruit Fly

A Mexican fruit fly was trapped in the city of Sacramento in Sacramento County. A Hold Notice was issued to the property where the fly was trapped and to the adjacent properties in order to stop the movement of potentially infested commodities. Program staff surveyed the area for host material and businesses that would be affected if a quarantine were to be established. Fortunately, the number of flies detected did not trigger a quarantine in this area.

Peach Fruit Fly, Orange County

A peach fruit fly was trapped in the city of Anaheim, Orange County. A Hold Notice was issued to the property where the fly find was trapped to stop the movement of potentially infested commodities. Program staff surveyed the area for host material. The detected fly did not trigger a quarantine in the area.

Panicle Rice Mite, Davis, Yolo County

In January 2009, a post entry inspection of rice plants in a research greenhouse at U.C. Davis resulted in the detection of *Steneotarsonemus spinki*, Panicle Rice Mite (PRM), a Q-rated pest not previously found in California. All rice plants within the greenhouse were destroyed through steam sterilization. CDFA Interior Pest Exclusion Program staff and USDA inspectors then collected samples from all campus greenhouses containing rice plants. Fourteen (14) of the 22 greenhouses sampled were positive for PRM. In some of these greenhouses, PRM was also detected on switchgrass. All rice and switchgrass plants in positive greenhouses were destroyed. Non-host plants were also removed from the infested greenhouses which were then steam sterilized. Due to the widespread infestation on campus and to avoid escape into field grown rice plots, CDFA ordered the destruction of all rice plants in campus greenhouses and growth chambers. Working closely with the U.C. Davis Department of Plant Pathology, CDFA allowed some rice plants deemed as part of critical research projects to be transferred under safeguarded conditions - and under CDFA and USDA supervision - to the level three containment facility located on campus. A 30-day plant-free period was then enforced for all previously infested

greenhouses. To avoid future problems, U.C. Davis developed a protocol which includes treating all incoming rice seed of both domestic and foreign origins. Before reintroducing rice into campus greenhouses, a plan was implemented by CDFA, USDA and U.C. Davis that included placing sentinel rice plants in all greenhouses that had contained rice plants. Samples were collected from these plants once a month for four months, continuing into 2010. Field surveys were also conducted in rice-growing areas of the State. To date, there have been no new PRM detections.

QUARANTINE TRAINING, DIRECTION, OVERSIGHT AND CONSULTATION

Interior Program staff instruct county inspectors on high risk parcel inspections during a 2009 Pest Prevention University training session.

Each county agricultural department provides the necessary staff to perform pest exclusion inspections at many locations within California. Interior Pest Exclusion provides regional training, direction, oversight and consultation for county agricultural commissioners' offices in order to ensure uniformity in exclusion procedures throughout the State.

INTERIOR PEST EXCLUSION

Topics for regional training sessions included the County High Risk Pest Exclusion Program, Interior Pest Exclusion extranet resources, Pest and Damage Report completion, Notice of Rejection completion and monthly reporting, quarantine violations, parcel inspection procedures, dog team inspection and program reporting, post entry quarantine, use of the Plant Quarantine Manual, violation investigation and prosecution, Huanglongbing and the Asian citrus psyllid.

Regional Training Sessions

Conducted by Interior Pest Exclusion in 2009

Sessions	Counties Served	Participants
18	36	378

In addition to regional training sessions, the Interior Pest Exclusion staff provides assistance to county inspectors in preparation for annual quarantine certification examinations and training to new county inspector biologists. Seven sessions were held in 2009 with a total of 42 attendees.

TRADE FACILITATION

Interior Pest Exclusion works cooperatively with the United States Department of Agriculture (USDA), agricultural officials from other states and the county agricultural departments to facilitate both domestic and foreign trade of agricultural products. This is accomplished by:

- Collaborating with other states
- Administrating the Federal Phytosanitary Program

Collaboration with Other States

The Program works with agricultural officials in other states to coordinate certification and inspection procedures that will meet California entry requirements.

Origin Inspection Program

Interior Pest Exclusion administers CDFA's Origin Inspection Program (OIP). This Program facilitates the entry of pre-qualified and pre-cleared agricultural commodities from participating shippers in other states. Encouraging origin inspection activities with regulatory officials in other states is an integral part of California's pest prevention system. The OIP mitigates pest risk at origin by requiring commodities to be inspected by regulatory officials in the other states before being shipped and consequently reducing the inspection workload in California. Ongoing negotiations with other regulatory agencies are required, as shippers request new commodities to be included in the program.

In 2009, 149 shippers in 11 states participated in the OIP. The commodities covered under the OIP include fruits and vegetables, cut flowers and cut greens, canola pellets, bulbs, seeds, grass sod and nursery stock.

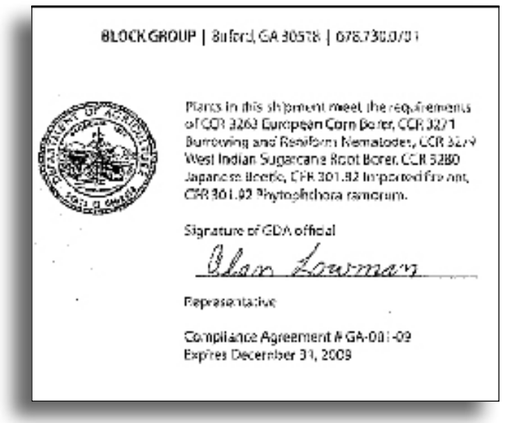
Origin Inspection Program

State	OIP Participants
Arizona	2
Colorado	1
Florida	2
Hawaii	28
Mississippi	1
Nevada	4
New Mexico	2
Ohio	1
Oregon	64
Utah	1
Washington	43
Total	**149**

Master Permits and Compliance Agreements

Interior Pest Exclusion worked with agricultural officials in Alabama, Arizona, Florida, Georgia, Hawaii, Illinois, Michigan, Nevada, New York, North Carolina, Ohio, Oregon, Texas, Utah, Washington and Virginia to develop compliance agreements and enforce stipulations of master permits. Compliance agreements and master permits were approved for the shipment of nursery stock, bulk produce and fresh fruit gift packages.

Phytosanitary Export Certification Administration

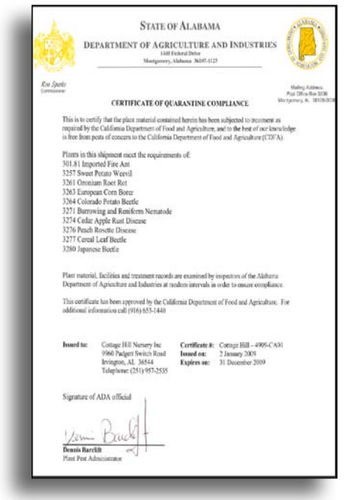

BLOCK GROUP | Buford, GA 30518 | 678.730.0/01

Plants in this shipment meet the requirements of CCR 3263 European Corn Borer, CCR 3271 Burrowing and Reniform Nematodes, CCR 3279 West Indian Sugarcane Root Borer, CCR 3280 Japanese Beetle, CFR 301.82 Imported fire ant, CFR 301.89 Phytophthora ramorum.

Signature of CDA official

Representative

Compliance Agreement # GA-001-09
Expires December 31, 2009


STATE OF ALABAMA
DEPARTMENT OF AGRICULTURE AND INDUSTRIES

CERTIFICATE OF QUARANTINE COMPLIANCE

Signature of ADA official

Dennis Burchfiel
Plant Pest Administrator

INTERIOR PEST EXCLUSION

Phytosanitary certification is a service provided to industry to meet the plant quarantine requirements of foreign countries, other states or California's own interior quarantines. This service helps facilitate domestic and foreign trade in agricultural commodities. The USDA is charged with nationwide implementation of the international phytosanitary certification program. Interior Pest Exclusion administers both this federal program in California for the USDA and the domestic phytosanitary certification program. Interior Pest Exclusion provides training to county agricultural commissioners' staffs to issue phytosanitary certificates.

Phytosanitary inspections may include post-harvest inspections of agricultural commodities at packing sheds or terminal inspection points, and/or growing season inspections of seed fields, nursery stock and fruit and vegetable stock. Staff performed over 194,000 inspections and issued more than 199,000 phytosanitary certificates in 2009.

Assistance with the Federal Phytosanitary Program

Interior Program staff assisted the USDA, Animal and Plant Health Inspection Service in administering the Federal Phytosanitary Program and resolving phytosanitary issues involving California exports. In 2009, some of the major export issues that CDFA helped to resolve are summarized in the following table:

Oranges to South Korea	Assistance with review of the Septora citri treatment program
Nursery stock to Canada	Assist with implementation of snail free operations for shippers to Canada
Stone fruit to Mexico	Assistance with pre-season audits and site visits to review trap and lure placement in groves
Citrus shipments to Australia	Assisted stakeholders with facilitating shipments despite Australian concerns regarding Asian citrus psyllid in southern California
Table grape shipments to New Zealand	Assist with work plan review and program implementation for the shipping season
Almond shipments to India	Assistance with review and interpretation of import permits which erroneously called for a seven-day fumigation period
Sweet potato whitefly (B. tabaci) concerns regarding strawberry plant shipments to the European Union	Collaborated with USDA to conclude that Bemisis tabaci not be a problem for field-grown strawberries for the coastal growing areas
Methyl Bromide prohibition for broccoli exports to Taiwan	Assisted industry to facilitate resumption of broccoli shipments to Taiwan after temporary ban due to California pesticide use regulations
Phytosanitary Certificate Issuance and Tracking (PCIT) user fees for plants and plant products	Collaborated with the USDA and the counties to implement the new fee structure incorporated into the PCIT system in California
Hay shipments to China	Assisted with initial facility evaluations to facilitate shipments into that country under a new work plan

CALIFORNIA DOG TEAMS

The purpose of the California Dog Teams is to enhance inspection and surveillance activities related to plant products entering the state of California via parcel delivery facilities and airfreight terminals.

Mariah Slusser and Bart in action

During 2009, California Dog Teams operated out of Contra Costa, Fresno, Sacramento, San Bernardino and San Diego counties and continued to intercept prohibited and regulated plant material entering California via unmarked parcels.

In October 2009, Los Angeles, San Diego and Santa Clara counties sent a total of four handlers to a 10-week training course at the National Detection Dog Training Center in Georgia. All four handlers successfully completed training and graduated in December 2009.

By the end of 2009, there were a total of ten teams operating out of eight counties in California.

San Diego County Detection Dog Friday sniffs out plant products

Each Dog Team is trained to inspect unmarked agricultural parcels to detect the presence of any unwanted plant pests, including insect species, diseases or other harmful organisms that may pose a threat to the economic well-being of the State. Currently, California Dog Teams conduct inspections at UPS, FedEx, DHL and other private parcel carriers in Alameda, Butte, Contra Costa, Fresno, Imperial, Marin, Napa, Monterey, Placer, Riverside, Sacramento, San Benito, San Bernardino, San Francisco, San Joaquin San Mateo, Santa Clara, Santa Cruz, Shasta, Solano, Sonoma, Sutter and Yuba counties.

INTERIOR PEST EXCLUSION

The California Dog Teams have demonstrated that unmarked parcels present a high-risk pathway for harmful pests to enter California. In 2009, the California Dog Teams intercepted 1,756 unmarked packages containing plant material, from which 91 pest interceptions were made, which included 18 actionable A- and 73 Q-rated pests. Types of pests intercepted included Asian citrus psyllids, ants, scale pests, weevils, whiteflies, mealybugs and aquatic weeds.

Fresno Dog Team Stephanie LeBarrón and Chelsea

A summary of Dog Team pest interceptions during 2009 is shown in the table below.

2009 Dog Team Pest Interceptions

Unmarked Packages	1,756
# of Actionable Pest Interceptions (A-and Q-Rated)	91
Number of Actionable Species	76

Some Significant California Dog Team Pest Interceptions

January - The San Bernardino County Dog Team hit on two large moving boxes. The unmarked parcels were sent from Alabama. The packages contained 50 pounds of sorghum cuttings. The inspector says that there were no roots attached to the sorghum, just long stems cut into 8-10 inch pieces. The plant material contained a Q-rated moth (*Moodna sp.*); the shipment was also rejected for violation of State Exterior Quarantine for European corn borer (CCR 3263).

February - Contra Costa County Dog Team, Cecilie Siegel and Bella, intercepted a package from a private shipper in Cuautla, Mexico while working at FedEx. Cecilie explains, "There was no indication that there was plant matter in the box. The box contained a number of things that were out of our jurisdiction so the plant matter was removed and the rest was sent on." In addition to plant material, the package contained a bag of homemade crusher, Mexican cheese, candies and other goods for personal consumption.

Cecilie and Bella

In total, 16 Q-rated pests were intercepted including: armored scale (*Diaspis sp,* Diaspididae Family.), gall midge (Cecidomyiidae Family), leaf miner (Agromyzidae Family), red-banded whitefly (*Trialeurodes exuriae*), soft scale (Coccidae Family) and whiteflies (*Aleurotrachelus sp.*, *Trialeurodes sp.* near *cryptus*, *Trialeurodes sp.* near *flonidensis*, *Trialeurodes sp.* near *honidensis* and *Trialeurodes sp.*).

March - Alameda County inspectors were working with the Contra Costa Dog Team (handler Mariah Slusser and Bart) at the FedEx facility. The Dog Team intercepted an unmarked package (in violation of marking requirement – Food and Agricultural Code Section 6421) from a private shipper in Miami, Florida. The 31-pound package was in a large KFC box and contained a wide variety of plant cuttings. The Alameda County inspectors took the package back to the office where they combed through the plant material to find one A-rated pest mealybug (*Dysmicoccus grassii)* and five Q-rated pests including white-footed ant (*Technomyrmex albipes),* carpenter ant *(Camponotus sp.),* weevil *(Myllocerus sp.),* red-banded whitefly *(Tetraleurodes sp.),* and a whitefly *(Aleurodicus sp.).*

Unmarked Package Contents

Additionally, the plant material was sent to the botany lab (nine PDRs) where it was identified. The majority of the plants were D-rated; however, the package did contain a Q-rated invasive vine (*Polygonum aubertiii*).

May - While conducting a parcel inspection at the DHL facility, Fresno County Inspector Stephanie LeBarron and her partner Chelsea intercepted a homemade care package of 'tea' from Lao. The 20-pound parcel contained unknown plant material, which was sent to the botany lab for identification. Most of the package contained nonpropagative wood chips, stem, root and fern stipes. However, Q-rated cinquefoil (*Potentilla sp.*) was also found. The cinquefoil was destroyed.

Stephanie and Chelsea

Tassie hitting on an unmarked package

June - While working the parcel belt, Sacramento County Dog Team Jennifer Berger and Tassie hit on a white unmarked package from a private shipper. The package was wrapped in tin foil and newspaper and contained several handmade leis from Hawaii. The leis were found harboring A-rated red wax scale and tropical palm scale (*Hemiberlesia palmae*) and Q-rated armored scale (*Aonidiella sp.*), croton whitefly and soft scale (*Pulvinaria sp.*/Coccidae Family). The leis were destroyed by the County.

July - The Fresno County Dog Team was working at a FedEx facility when Chelsea hit on a canvas gym bag. This was no ordinary gym bag – it contained clothes, jewelry, knick-knacks, peppers, nail polish, newspaper and a grocery bag of plant and leaf material (*believed to be curry leaves*).

INTERIOR PEST EXCLUSION

Ten A-rated Asian citrus psyllid nymphs and adults (*Diaphorina citri*) were found in the leaf material. Further testing confirmed that the nymph psyllids were positive for A-rated Huanglongbing disease.

The gym bag originated from Kochi, India and made its way on Emirates Airlines to the Los Angeles FedEx Air Facility. It was then sent via FedEx Air to Fresno, where the owner resides.

Stephanie and Chelsea

The bag somehow managed to bypass customs clearance and the USDA. The bag still had the original "packing" tape that was placed on the gym bag by the Emirates Airlines at origin. The "packing" tape was not disrupted upon arrival in Fresno County. Furthermore, there was no certification of customs clearance.

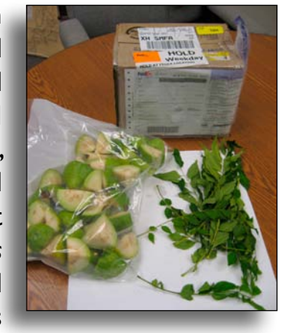
The plant material was destroyed. The other contents of the gym bag were inspected and released to the owner. The USDA/Safeguarding Interdiction and Trade Compliance (SITC) Team was notified.

State agriculture crews conducted a survey for Asian citrus psyllids near the package's destination. CDFA crews also deployed traps in a one-square-mile area, conducted visual surveys and used a vacuum device on host plants all with negative results. Furthermore, the SITC team is continuing their investigation of the incident.

Jennifer and Tassie

August - Sacramento County Dog Team Jennifer and Tassie, and Sacramento County Inspector Gafar intercepted a small unmarked package from Texas at the FedEx facility in North Sacramento. The package was a family hodgepodge: with the Texan uncle sending his nephew a needed part, plus a few "unexpected" surprises including guavas and curry leaves.

Because curry leaf presents a high risk for transporting Asian citrus psyllid (ACP), the dog handler and Sacramento County inspector acted quickly by safeguarding the package and returning to the agricultural commissioner's office for a detailed inspection. Back at the office, many suspect ACP samples (adults and nymphs) were collected and submitted to the CDFA Plant Pest Diagnostics Center (lab). The exact number of live ACP found in the package is unknown (*county reports that there were too many to count*). The samples were later confirmed to be A-rated ACP (*Diaphorina citri*). Additionally, the curry leaves were submitted to the lab (center) for Huanglongbing (HLB) testing. Fortunately the samples were found negative for the disease.



Infested Curry Leaf

September - San Diego County Dog Team, Jeremy Partch and Friday, intercepted a shipment of 10 cherimoya fruit at a FedEx location. The unmarked parcel originated from the state of Florida and was in violation of the following regulations:

- California FAC 6421, Markings: Shipments of plant material must have the name and address of the shipper and receiver, origin of material and a statement of contents.
- California FAC 6461.5, Live Pests: Lab results revealed that the cherimoya fruit was infested with Pseudococcus odermatti (mealybugs) and Tortricidae (family), both 'Q' rated pests not known to occur in California. The fruit was rejected and destroyed.

Detection Dog Friday and Handler Jeremy Partch

COUNTY HIGH RISK PROGRAM

The County High Risk Pest Exclusion Program (CHRPEP) was established in December 1998 by urgency legislation, Senate Bill 2062, Rogers (Chapter 635, Statutes of 1996), known as "the Rogers' Bill," to augment funding for counties to perform inspections on incoming shipments at the destination (terminal) points. The CHRPEP is a cooperative program that provides funds to county agricultural commissioners to conduct high-risk pest exclusion activities under state oversight by the California Department of Food and Agriculture (CDFA).

A study found that conducting a statewide County High Risk Pest Exclusion Program at optimal levels would cost approximately $14 million per year. In 1998, Section 2282.5 of the Food and Agricultural Code and a state budget augmentation provided the county agricultural commissioners (CACs) with $5 million to conduct an optimal level program for the latter portion (December-June) of fiscal year 1998/99. CDFA allocated funding by way of a negotiated work plan process with the CACs.

In 1999, Section 2282.5 was amended, providing for continuation of the program in fiscal year 1999/2000 by extending the June 29, 1999, sunset date to June 30, 2000. In fiscal year 2002/03, the High Risk Program's funding had been reduced to $5.5 million with Scientific Evaluation Trapping paid out of CDFA's funds.

INTERIOR PEST EXCLUSION

High Risk Inspections

The primary responsibility of the County High Risk Pest Exclusion Program (CHRPEP) is to provide guidance and funding to county agricultural commissioners to conduct high risk pest exclusion activities at first point of entry terminals within California. The CHRPEP is a vital component in the State's overall pest prevention efforts and is a crucial part of CDFA's mission to protect agriculture and the environment from the threat of newly introduced exotic pests.

For FY 2008/09 and FY 2009/10, $5,500,000 was disbursed to 43 counties to conduct high risk pest exclusion activities. Funding for each county varied based on the pest risk of specific pathways and the volume of work associated with those pathways. The top priority pathways were parcel facilities, airfreight shipments, nursery stock shipments and truck shipments of beehives from red imported fire ant (RIFA) infested areas.

As a result of the CHRPEP, a total of 1,459 shipments were rejected in 2009 for the presence of A- and Q-rated pests.

Fresno County inspectors found evidence of red imported fire ant on a shipment of beehives

In addition to A- and Q-rated pest detections, there were 241 seizures of foreign origin plant pest and quarantine material brought into California illegally in 2009. These detections are outlined in the table below.

Foreign-Origin Materials Rejected in 2009

Material	# of Rejected Shipments	Origin
Animals	1	Algeria
Bulbs	4	Canada, Netherlands
Cut flowers	42	Colombia, Costa Rica, Ecuador, France, Israel, Netherlands, Thailand
Cut foliage	5	Costa Rica, Ecuador
Cuttings	79	Australia, Canada, Colombia, Costa Rica, Dominican Republic, Guatemala, Mexico, Netherlands, Uganda, United States Minor Outlying Islands, Viet Nam
Foliage	1	Costa Rica
Fronds	10	Costa Rica
Fruit	40	Argentina, Brazil, Chile, Costa Rica, Dominican Republic, Guatemala, Honduras, Israel, India, Morocco, Mexico, United States Minor Outlying Islands
Herbs	2	Mexico
Leaves	25	Colombia, Costa Rica, Ecuador
Plants/plant material	19	Armenia, Canada, Costa Rica, Thailand, South Africa, Syria
Root	2	Peru
Seeds	4	Lebanon, Thailand, United States Minor Outlying Islands, South Africa
Vegetables	7	Argentina, Dominican Republic
Other	24	Canada, Costa Rica, India, Cambodia, Mexico
Total	**241**	

Note: Notice of Rejection data source. Not all counties are reporting.

INTERIOR PEST EXCLUSION

Below are some examples of High Risk activities and inspections conducted by county inspectors in 2009.

Coqui Frog PDR 1407958 January 23, 2009

Coqui frog
(Photo: Caryn Moen, Shasta County)

San Francisco County inspector Rhodora Lino intercepted Q-rated coqui frog (*Eleutherodactylus coqui*) on a shipment of dracaena plants sent by California and Hawaii Foliage Growers in Papaikou, Hawaii. Rhodora found the frog in the base of the box and described the frog as light green in color, with very thin skin – so thin you could see its insides. The plants were treated with citric acid and will be released pending a negative re-inspection.

Master Permit QC 650 states that all nursery stock shipped under the compliance agreement shall be free of A-, B- and Q-rated pests. Furthermore, coqui frogs are listed as "detrimental animals" under the California Fish and Game Commission's Wild Animal Policy (Title 14, Section 671 of the California Code of Regulations). The Hawaii Department of Agriculture has been notified and is working to resolve the pest issue at the nursery.

Bee on the Lookout PDR 1556632-3 February 3, 2009

Merced County intercepted A-rated red imported fire ant (RIFA), *Solenopsis invicta*, on Texas beehives sent by McEvoys House of Honey and Bee Line Apiaries. The inspectors report that it appeared the hives had been sprayed with insecticides as only dead ants were found in the truck bed. They found the live RIFA in the sides of the beehive boxes where the ants were probably protected from an insecticide spray. The beehives were fumigated.

Counties are reporting that beehive shipments from Texas have been arriving with a voluntary ant-free apiary certificate. The Texas Department of Agriculture is ***not*** a participant in this program and CDFA does ***not*** recognize this type of certification from Texas.

Life at LAX PDR 1308598 March 5, 2009

On March 5, Los Angeles County inspectors working at the Los Angeles International Airport made an interesting pest find. Inspectors intercepted a Q-rated cricket (Grillidae Family) in a shipment of pineapples from Brazil. There were 180 boxes (three skids wrapped in bug-netting) in the shipment. The shipment was cleared by the USDA at the first point of entry. The county reports that no treatment stamps or carton markings were observed. The shipment was destroyed under Food and Agricultural Code Section 6461.5 for presence of pests.

The shipment was placed under quarantine hold while waiting for the cricket to be identified and rated by the CDFA Plant Pest Diagnostics Center (lab).

No SOD Wood in My Neighborhood NOR 03172009-EP-1 March 2009

Photo courtesy of Eric Pittman, Butte County

Butte County agricultural inspector Eric Pittman intercepted an unmarked package from United Forest Products containing bark chips, mulch and soil while performing parcel inspections at FedEx. The wood products originated from the forest floor in Sonoma County, which is a quarantined area for *Phytophthora ramorum* (causal pathogen of Sudden Oak Death or SOD). After investigation, Eric discovered the shipper had been pre-notified by Sonoma County that they needed to be under compliance for the *P. ramorum* State Interior Quarantine before they could ship their wood products.

The package was rejected for Food and Agricultural Code FAC) Sections 6501 (lack of intrastate markings) and 6521 (reasonable cause to presume that intrastate shipment may be infested or infected with a pest). The package was destroyed.

Santa Barbara is Glad Happy PDRs 1554947, 1269648 March 30 & April 3, 2009

On March 30 and April 3, while conducting a FedEx parcel inspection, Santa Barbara County Biologists Tashina Simon and Heather Scheck intercepted shipments from Jacobs Trading containing yellow gladiolas from the Netherlands. The plants were inspected and found infected

INTERIOR PEST EXCLUSION

with Q-rated gladiolus rust (*Uromyces transversalis*). The County destroyed the plants. Because the flowers are of a foreign origin and gladiolus rust is a federally-actionable pest which is being actively surveyed for in California by the State Plant Health Director's Office, the USDA has been notified of this interception.

As of April 3, 2009, Santa Barbara County had intercepted three shipments from Jacobs Trading. Two of the shipments were also in violation of California FAC Section 6421 for lack of markings.

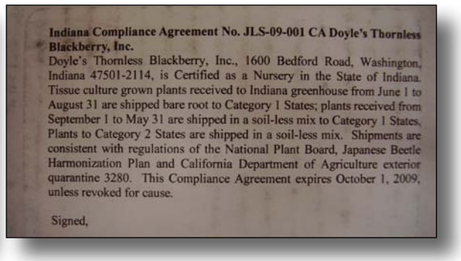
Tashina Simon inspects the gladiolas shipment from the Netherlands

Gladiolus rust

Santa Cruz Sleuth Sees No Origin Statement NOR 440R2009500154 May 2009

Santa Cruz inspector Tony Dennis intercepted a shipment from Doyle's Thornless Blackberries at United Parcel Service (UPS) sent from an Indiana address. The package was accompanied by an official certificate issued from the Indiana Department of Natural Resources stating all applicable California quarantines had been met. However, the package lacked a statement of growing origin as required by the California FAC Section 6421. Tony pointed out this was a real scenario of a topic covered in the recent training provided by Interior Pest Exclusion staff.

The package was placed on hold and once contacted, the shipper indicated the plant was from Florida. The shipment was destroyed for not meeting FAC 6461.5 (reasonable cause to presume infestation) and FAC 6421 for lacking an origin statement.



Indiana Compliance Agreement No. JLS-09-001 CA Doyle's Thornless Blackberry, Inc.
Doyle's Thornless Blackberry, Inc., 1600 Bedford Road, Washington, Indiana 47501-2114, is Certified as a Nursery in the State of Indiana. Tissue culture grown plants received to Indiana greenhouse from June 1 to August 31 are shipped bare root to Category 1 States; plants received from September 1 to May 31 are shipped in a soil-less mix to Category 1 States. Plants to Category 2 States are shipped in a soil-less mix. Shipments are consistent with regulations of the National Plant Board, Japanese Beetle Harmonization Plan and California Department of Agriculture exterior quarantine 3280. This Compliance Agreement expires October 1, 2009, unless revoked for cause.

Signed,

Photos courtesy of Santa Cruz County

CERTainly Not Acceptable NOR 361R2009900267 September 2009

San Bernardino County inspector Keri Vigil inspected a nursery stock shipment from Hines Nursery, Oregon at a Lowe's store in Rancho Cucamonga that contained *Syringa species* which is a genus on the host list for *Phytophthora ramorum*. Keri rejected the shipment because federal certification 7 CFR 301.92 for *Phytophthora ramorum* was missing. The rejection was issued because the shipment also contained pine species that lacked certification for California Code of Regulation 3275 for European Pine Shoot Moth.

7 CFR 301.92 certification is mandatory for interstate nursery stock shipments of host species from *P. ramorum* regulated states, including Oregon.

A Sour Surprise NOR 071R2009L00163 December 2009

It was a bitter sweet gift for the intended recipient of this Meyer lemon tree, intercepted by Contra Costa County Deputy Agricultural Commissioner Joe Deviney. On December 17, 2009, Joe identified a UPS parcel with no markings *and* no certification shipped from "Meyer Lemon Tree" in Georgia. The parcel contained one Meyer lemon tree packaged with soil. The parcel was in violation of the following quarantines:

Joe Deviney gets down with his inspection of the suspicious Meyer lemon tree. This parcel was definitely a sight for "sour" eyes!

- Federal Domestic Quarantine 301.81- Imported Fire Ant
- Federal Domestic Quarantine Order Citrus Greening and Asian Citrus Psyllid
- California Food and Agricultural Code 6421- Markings
- California Code of Regulations, State Exterior Quarantines: 3250- Citrus Pests, 3271- Burrowing and Reniform Nematodes, 3279- West Indian Sugarcane Root Borer and 3280- Japanese Beetle

Samples submitted to the CDFA diagnostics lab yielded negative results for the presence of nematodes and Huanglongbing (HLB). After sampling, the Meyer lemon tree was destroyed.

Because the parcel violated federal quarantines, Smuggling Interdiction and Trade Compliance (SITC) were contacted to initiate an investigation. SITC agents discovered that the tree had been ordered online by a person in Iowa as a gift to be received in California. The tree was shipped from Georgia to California by "meyerlemontree.com", though the company claims not to ship

INTERIOR PEST EXCLUSION

citrus into California, Arizona or Texas. SITC has contacted the shipper and is continuing the investigation to determine if any additional shipments have been sent into California and what can be done to prevent similar shipments in the future.

Agricultural Commodities Investigative Team

In 2009, an ACIT Investigator conducted 16 investigations of alleged Food and Agricultural Code violations. The investigations involved the illegal movement of quarantine material including prohibited exotic fruit and nursery stock.

Cases settled in 2008/09:

In May 2008, an investigation was initiated by CDFA into an illegal plant importation by a nursery owner in San Francisco. The shipment contained 286 plants that lacked both bills of lading and certificates from the Florida Department of Agriculture and Consumer Services. The purpose of certification is to prevent the importation of plants infested with pests not native to California.

In July 2009, the San Francisco District Attorney reached a settlement in this case and a stipulated judgment was placed against the nursery owner. The nursery owner paid a $15,000 civil penalty for trying to import uncertified plants into California from the state of Florida. The defendant also paid $4,690 in investigative costs to CDFA.

In 2007, packages of Indian mangos and yams labeled "ladies apparel" were imported into California. An airport dog discovered the packages. State and federal laws prohibit the importation of untreated mangos and yams from India because they can be infested with crop-damaging pests such as Oriental fruit fly. CDFA launched an investigation into the international express courier company. The Attorney General's Office charged the company with violating the California Food and Agricultural Code and engaging in unfair business practices. CDFA and the Attorney General's Office worked together to complete an agreement with the express courier company. The settlement prevents them from importing produce that has not been properly inspected for foreign pests. The company also paid $40,000 in civil penalties. If the agreement is violated in the future, they will be forced to pay $1.6 million.

• NURSERY, SEED AND COTTON PROGRAM •

NURSERY PROGRAM

The mission of the Nursery Program is to prevent the introduction and spread of agricultural pests through nursery stock and to protect agriculture and the consumer against economic losses resulting from the sale of inferior, defective or pest-infested nursery stock. In 2009, the total value of nursery and floral products produced was $ 3.7 billion, a decrease of 7.5 percent over the previous year. The cost to run the Nursery Program for 2008/09 fiscal year was $2.3 million. Nursery program activities are funded entirely from revenue received in the form of license and acreage fees, and registration and certification fees. Revenue received in fiscal year 2008/09 totaling $2.2 million was used to offset the costs of all program activities.

NURSERY REGULATORY AND INSPECTION ACTIVITIES

Financed primarily through license and acreage fees, nursery regulatory activities are conducted by the county agricultural commissioners and their staff and are an integral part of the State's agricultural pest prevention system. Nursery inspection and regulatory activities have prevented numerous pests from being disseminated throughout agricultural and suburban communities by preventing and/or eradicating pests at the nursery level. The quality of nursery stock has improved as a direct result of the regulation of nursery stock.

In 2009, there were 11,917 licensed sales locations with 1,010 production (growing grounds) locations. Since 2007, the budget for nursery inspection contracts has been set at $600,000. In addition, any disencumbered funds from the previous year's nursery contracts are added to the next annual allocation. The amount added to the allocation for this year was $48,563, resulting in a total of $648,563 to be divided among the counties for the 2009/10 fiscal year contracts.

REGISTRATION AND CERTIFICATION SERVICES FOR PLANT MATERIALS

The California Food and Agricultural Code authorizes the Department to establish plant registration and certification (R & C) programs (see Table 1). These programs are implemented by the California Code of Regulations and enforced by the Secretary. In 2009, CDFA staff performed over 855 inspections for R & C, including site approvals, growing season inspections, sampling for various purposes and harvest inspections. In addition to making inspections to meet R & C requirements, all nursery stock must also meet the general nursery regulatory standards for pest cleanliness.

INTERIOR PEST EXCLUSION

R & C programs are voluntary programs developed at the request of various segments of the agricultural industry for the exclusion of specific plant pests that are not readily detected by ordinary inspections. These programs are the result of close working relationships between the University of California, USDA and CDFA, with the added support of the agricultural industry. Specific viruses, viroids, fungi, soil-borne pathogens and nematodes are the targeted pests of the nursery stock registration and certification programs.

The criteria for establishing these programs are: 1) there is an established need 2) sufficient technical information is available 3) a source of "clean" propagating stock has been established and 4) methods have been developed to assure the continued pest cleanliness of the stock.

California presently has nine "clean stock" (registration and certification) programs available for use by the various segments of the agricultural industry.

Table 1. Registration and Certification Programs

PROGRAM	PLANTING TYPE (BLOCKS)	TARGET PEST	TESTING OR TREATMENT REQUIRED
Avocado Certification	Certified	Phytophthora cinnamomi	Hot water treatment of seed and soil fumigation
Avocado Registration	Registered (tree)Increase	Sun Blotch Viroid	Foundation tree index-testing for sun blotch viroid (UC)
Citrus Registration and Certification	Foundation, Scion, & Seed (tree) Increase Certified (nursery row)	Citrange stunt, concave gum, exocortis, psorosis, tatterleaf, seedling yellow tristeza, tristeza vein enation and yellow vein viruses	Index testing (UC) + individual tree identification index-testing (CDFA)
Deciduous Fruit and Nut Tree Registration and Certification	Foundation, Mother, Scion, & Seed (tree) Increase Seed (bed) Certified (nursery row)	Various virus diseases, including prunus ringspot virus (PRSV) and prune dwarf virus (PDV)	Index-testing (UC) + index-testing for PRSV and PDV (CDFA) (Participant)
Grapevine Registration and Certification	Foundation & Increase (vineyard) Certified (nursery row)	Fanleaf, fleck, asteriod mosaic, leafroll, yellow vein (Tomato ring-spot), corky bark virus	Nematode sampling (CDFA)
Seed Garlic Certification	Increase Certified	Stem and bulb nematode (*Ditylenchus dipsaci*) and white rot	Nematode sampling (CDFA)
Pome Fruit Tree Registration and Certification	Foundation & Mother (tree) Increase & Stool Certified (nursery row)	Various virus diseases	Index-testing (USDA & UC) fumigation
Strawberry Nursery Stock Certification	Foundation Increase Certified	Mottle, vein-banding, crinkle, mild yellow-edge, necrotic shock, pallidosis, tomato ring-spot, witches-broom, pseudo mild yellow-edge, latent "c," leafroll, and feather-leaf viruses	Index-testing (UC & CDFA) Nematode sampling
Nematode Certification	Nursery plantings produced for on-farm planting	Various plant-parasitic nematodes	Nematode sampling, fumigation supervision, and commodity treatment (CAC & CDFA)

• NURSERY, SEED AND COTTON PROGRAM •

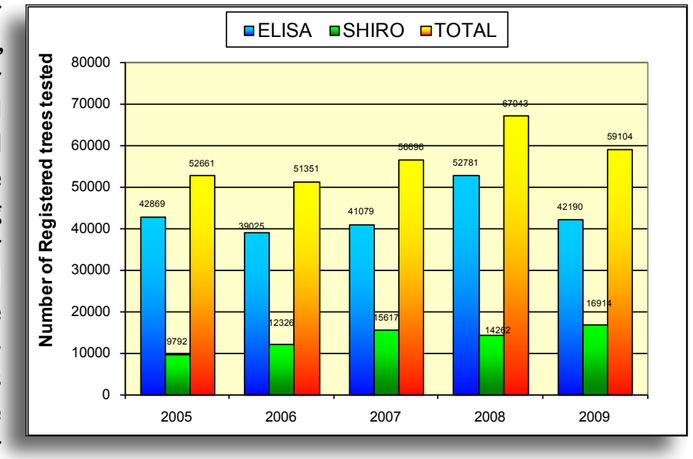
The primary tools developed for maintaining pest cleanliness of the stock in these programs are: 1) biological indexing (use of indicator plants which exhibit symptoms of virus or virus-like diseases) and enzyme-linked immunosorbent assay (ELISA) 2) laboratory techniques for the detection of nematodes 3) eradication treatments (thermotherapy, fumigation and hot water treatments) and 4) visual field inspections targeted to specific life cycles of the pests and plants.

The costs of services to carry out these programs are borne by the participants. Fees are charged for the inspections, testing and treatments. In addition, the Fruit Tree, Nut Tree and Grapevine Improvement Advisory Board (IAB) provides partial-to-full funding for annual testing and inspections required by the Deciduous Fruit and Nut Tree R & C, Pome R & C and Grapevine R & C programs.

Avocado Registration and Certification Program

This program provides the registration of avocado rootstock and scion wood sources when inspected and tested for sun blotch virus. The Avocado Certification Program provides the certification of avocado nursery stock when grown under specific guidelines and inspected for freedom from *Phytophthora cinnamomi*, avocado root rot. Currently, one nursery is participating in the registration program and three nurseries are participating in the certification program.

Deciduous Fruit Tree and Nut Tree Registration and Certification Program



In the R & C program for deciduous fruit and nut trees, all trees in a Registered Mother Block, Registered Scion Block and Registered Seed Block are tested annually for viruses. Testing may be done by biological indexing using Shirofugen cherry as an indicator plant or by ELISA, an approved laboratory technique. Trees are tested for Prunus Necrotic Ring-Spot Virus and Prune Dwarf Virus by biological indexing at least once every five years and by ELISA for these viruses and others in the other four years. Tested trees may be used as a source of certified propagative material in the year following testing.

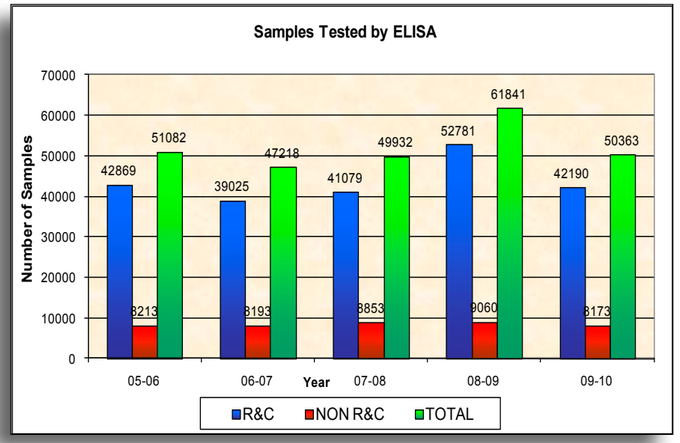
INTERIOR PEST EXCLUSION

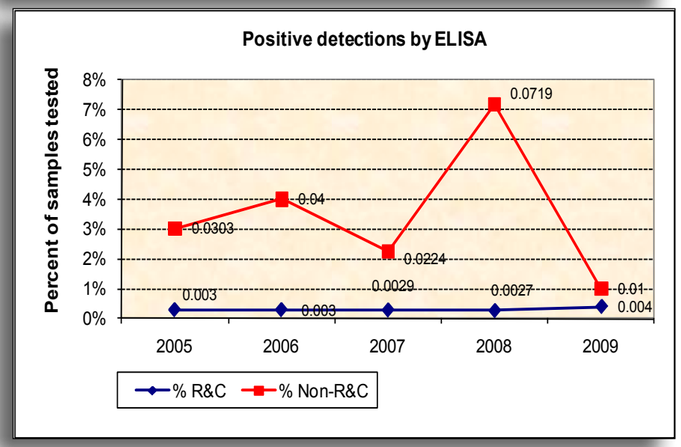
In 2009, 18 nurseries participated in the program. The total number of registered trees tested was 59,104 (42,190 by ELISA and 16,914 by Shirofugen indexing), compared to an average of 56,938 per year for the 2005-2008 growing seasons.

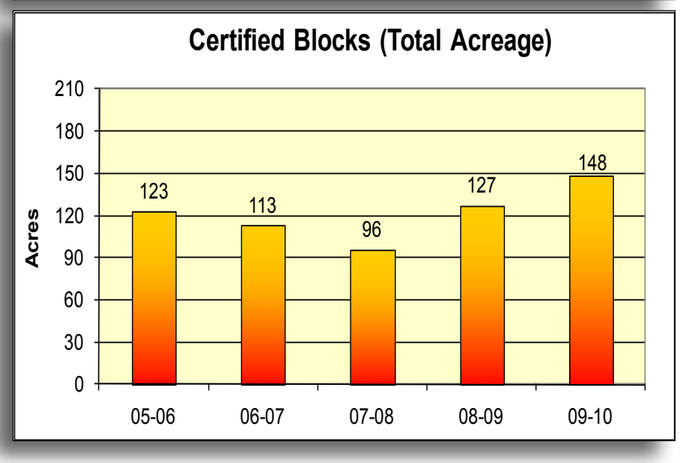
The total number of trees tested using the ELISA technique was 50,363 (42,190 registered trees and 8,173 service samples). The service samples are obtained from non-registered trees and tested as a service to the industry.

Of the 50,363 trees tested by ELISA, 250 (0.5%) were found positive for viruses. Only 170 (0.4%) of the registered samples tested positive for viruses, while 80 (1.0%) of the service samples tested positive for viruses.

Of the samples taken from registered trees, 15 (0.09%) tested positive for viruses using the Shirofugen cherry biological indexing technique. Certified nursery planting acreage totaled 148 acres in 2009, compared to an average of 115 acres over the previous four years.





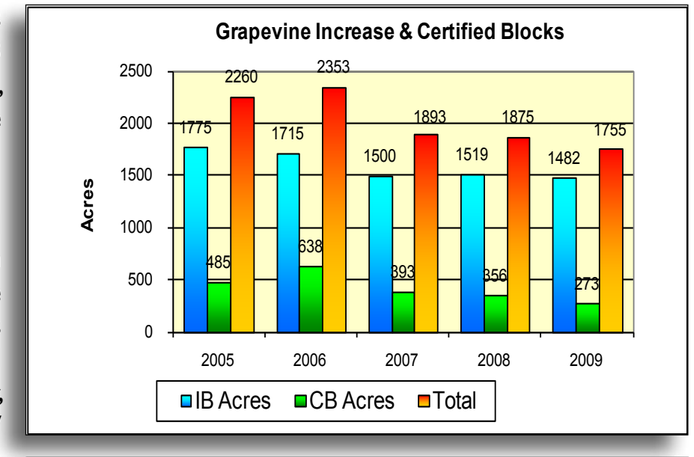


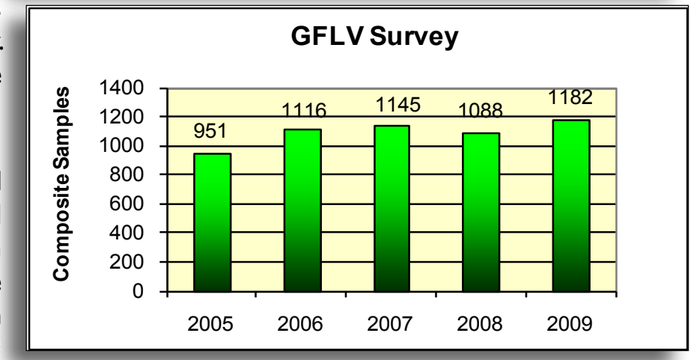
• NURSERY, SEED AND COTTON PROGRAM •

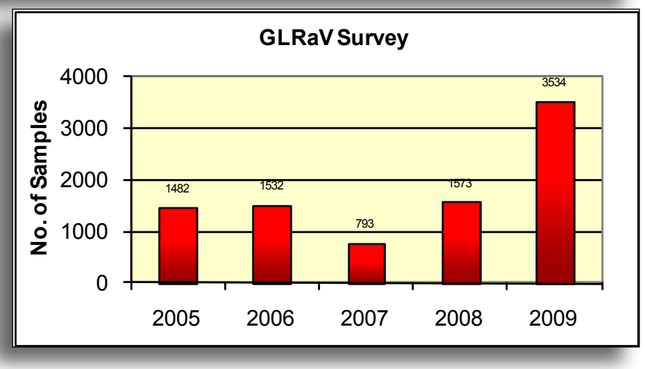
year. Grapevine certified blocks (nursery plantings) totaled 273 acres and five greenhouse blocks, 83 acres (23%) decrease from the previous year's 356 acres.

CDFA collected and tested 1,182 composite samples (each is a composite sample from five vines) for grapevine fan leaf virus (GFLV). Plants were selected randomly for testing. However, if plants exhibiting typical GFLV symptoms were seen, those plants were also included in the survey. Of the total samples tested, none were positive for GFLV.

In 2009, 3,534 vines were sampled and tested for grapevine leafroll associated viruses (GLRaV). In total, 77 samples tested positive (2.2%) for leafroll virus – three in compared with 56 out of 1,573 samples (3.56%) that tested positive in 2008.







In 2004, the Fruit Tree, Nut Tree and Grapevine Improvement Advisory Board (IAB) began supporting trapping for vine mealybug (VMB). The shipment of grapevine nursery stock within California became a problem as some northern counties were contemplating ordinances. Traps were deployed in certified (both Increase and Certified Blocks) and in non-certified plantings. Eight counties assisted CDFA in trapping by doing non-certified plantings and, in some cases, plantings in CDFA's Grapevine R & C Program. There were over 1,600 acres and 3 greenhouses of non-certified plantings. This represented 85 traps deployed in late May and checked over the

Grapevine Registration and Certification Program

Thirty-three nurseries participated in the program in 2009. Grapevine Increase Block plantings totaled over 1,482 acres, a decrease of 37 acres (2.4%) less than the previous

INTERIOR PEST EXCLUSION

following six months. There were 1,683 acres and 5 greenhouses of plantings entered in the registration and certification (R & C) programs for 87 traps deployed. Male VMBs were found at 15 locations due to association with nearby vineyards. There were three positive finds for female VMB following intense inspections.

Citrus Registration and Certification Program

The Citrus R & C program provides for the testing of propagative source trees for tristeza to meet the requirements of the Citrus Tristeza Quarantine. Other diseases of importance being tested as part of the registration and certification program include exocortis and psorosis. In 2009, 37 citrus nurseries participated in the program. A total of 4,304 citrus seed and scion source trees were sampled and tested for tristeza and other viroids, an increase of 1,934 trees from 2008.

Strawberry Nursery Stock Registration and Certification Program

Ten nurseries participated in the Strawberry Nursery Stock R & C Program in 2009. The strawberry program differs from other registration programs in that foundation stock is maintained by nurserymen in their isolated plantings rather than by the Foundation Plant Services of the University. Strawberry plants in foundation plantings are index-tested annually using *Fragaria vesca* and *Fragaria virginiana* strawberry indicator hosts for the following viruses: mottle, vein-banding, crinkle, mild yellow-edge, necrotic shock, pallidosis, tomato ringspot, witches broom, pseudo mild yellow-edge, latent C, leafroll and featherleaf. CDFA nursery staff index-tested 9,358 foundation plants at CDFA's greenhouse facility in Sacramento; a 53 percent increase was seen over the previous year. Twenty-four plants that were indexed tested positive for viruses and were rejected from the program. CDFA staff visually inspected over 849 acres of registered and certified strawberry nursery stock for the presence of virus diseases and other pests, and collected and processed nematode samples.

• NURSERY, SEED AND COTTON PROGRAM •

Pome Fruit Tree Registration and Certification Program

The Pome Fruit Tree R & C Program provides for the registration of rootstock and scion sources for the propagation of certified nursery stock when inspected and tested for virus diseases and other important pests. Three nurseries are currently participating in the program. In 2009, CDFA staff inspected and registered over 2,225 trees as propagative source trees. Over two acres of nursery plantings were inspected and approved for sale as certified nursery stock.

Seed Garlic Registration and Certification Program

The Seed Garlic R & C Program provides for the registration of seed garlic for the propagation of certified nursery stock when found free from stem and bulb nematode, *Ditylenchus dipsaci*, and when inspected and found free of white rot fungus, *Sclerotium cepivorum*. Two nurseries participated in 2009. A total of 20 acres were inspected and registered, a decrease of 48 acres (70 percent) from 2008.

FRUIT TREE, NUT TREE AND GRAPEVINE IMPROVEMENT ADVISORY BOARD

The Fruit Tree, Nut Tree and Grapevine Improvement Advisory Board (IAB) element of the Nursery Program administers an industry-requested assessment (Food and Agricultural Code, Section 6981) on the production of nursery plants, such as deciduous pome and stone fruit trees, nut trees and grapevines. The mission of the IAB is to improve the quality and pest-free fruit tree, nut tree and grapevine nursery stock offered for sale. The assessment is used to fund research on plant pests, breeding varieties that are resistant to plant pests, plant pest diagnostics, varietal identification and disease elimination. The University of California Foundation Plant Services (FPS) provides support and serves as a source of clean planting stock. The FPS carries out activities related to the development of planting materials for pome and stone fruit trees, nut trees and grapevines, and subvents the costs to carry out CDFA programs concerning the registration and certification of pome and stone fruit trees, nut trees and grapevines. The assessment is collected with the nursery license renewal. In 2009, the total assessment collected on gross sales of fruit trees, nut trees and grapevines was $ 1,294,842, a 1.5 percent decrease from the collection of $1,315,202 in 2008.

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In 2009, the IAB approved funding for 12 research proposals totaling $275,000; funding of Foundation Plant Services in the amount of $525,672; and, payment to the Nursery Program to subvent R & C activities in the amount of $344,441. The total budget approved was $1,500,000. As revenues still remain low relative to the past five years, the Board recommended a lower level of funding for research; the Foundation Plant Services (University of California, Davis); and, the CDFA R & C program.

SEED SERVICES

The Seed Services Program administers seed law enforcement throughout California and is funded entirely through an annual assessment on the value of agricultural, vegetable and grass seed sold in California. Staff of the Seed Services Program assist county agricultural commissioners in all seed- related enforcement activities and evaluate compliance at the local and statewide level. CDFA associate agricultural biologists conduct seed sampling and coordinate enforcement activities of assigned counties, as well as investigate seed complaints. The Seed Services Program interacts with agricultural departments in other states, the USDA, industry representatives and the California Crop Improvement Association, which is the authorized seed certifying agency for California. An advisory board of nine seed industry members and two public members provides oversight of the Seed Services Program for CDFA.

The value of seed sold for planting in California exceeded $533 million in FY 2008/09, an all-time high. The total number of firms registered to sell seed in California was approximately 500 firms in FY 2008/09.

The expenditures by the Seed Services Program for FY 2008/09 were $1,264,226.37. Significant program expenditures were the funding of CDFA's Seed Laboratory ($461,556), the Seed Biotechnology Center at UC Davis ($240,000) and the Seed Subvention contracts paid to agricultural commissioners ($120,000). In order to cover these expenses, the Seed Advisory Board recommended an assessment rate of $0.32 per hundred dollars of gross sales in California during the reporting period. Recent furloughs of state employees have resulted in reduced expenditures. The funds generated by the current assessment rate are adequate to cover expenditures in 2009.

The subvention to county agricultural commissioners for the enforcement of the California Seed Law remains at $120,000, provided annually by FAC Section 52323. This voluntary program uses annual performance measures to establish the funding for each county. The commissioners are required to maintain an 85 percent compliance level of all seed offered for sale or labeled in their respective counties. In FY 2008/09, county personnel evaluated 3,700 labels of seed offered for sale. In addition, 2,900 unique labels of seed lots from out-of-state seed suppliers were inspected by county staff for compliance to the California Seed Law.

The Seed Services Program also administers an alternative dispute resolution process for farmers and labelers in dispute over seed performance. Participation in conciliation and mediation is a mandatory prerequisite before pursuing legal remedy in court for seed complaints. In FY 2008/09, the Seed Services Program received one formal seed complaint that was settled through the alternative dispute resolution process.

CDFA agricultural biologists stationed throughout the state continue to perform compliance monitoring through the annual collection of over 600 seed samples. The samples are analyzed by the CDFA Seed Laboratory in Sacramento. A recent analysis of the laboratory results revealed that greater than 96 percent of the samples were in compliance with the California Seed Law, while only 4 percent were found to be out of compliance. Of the non-compliant samples, about 50 percent were misrepresenting germination by a slight amount, while the remaining 45 percent had slight misrepresentations of the percent purity and five percent had slight misrepresentations of inert material.

The Seed Services Program is continuing its efforts to prevent violations of the Plant Variety Protection Act (PVPA) and Certified Seed standards. New inspection forms have assisted inspectors in the identification of PVPA violations and Certified Seed lots. The Seed Services Program will work with the Federal Seed Regulatory and Testing Branch and the California Crop Improvement Association to implement additional measures that insure seed sold in California is of the best quality and the maximum benefit to growers.

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QUALITY COTTON PROGRAM

The Quality Cotton Program has the primary responsibility of enforcing the San Joaquin Valley Cotton District laws and regulations. The Cotton District consists of all counties in the San Joaquin Valley. The 26-member San Joaquin Valley Cotton Board, composed of cotton growers, cotton industry representatives and public members administers the Program. Cotton growers and industry members are elected to the Board by their peers.

One of the Board's major duties is to establish quality standards for San Joaquin Valley Acala and Pima varieties. To accomplish this, the Board has a multi-location cotton variety-testing program. The Board meets at least four times a year to review the progress of its variety-testing program and determines which new varieties meet or exceed existing quality standards and are superior in some meaningful respect, such as improved yield or resistance to disease. The exceptional quality and yield of the cottons in the District are a reflection of the Board's sound decisions. Throughout the year, board committees examine major cotton issues in order to make well-researched recommendations to the full Board.

In 2009, CDFA's Pink Bollworm Program reported another huge drop in total cotton acreage in the San Joaquin Valley. Pima acreage was 118,975, down almost 22 percent and Upland acreage (including Acala) was 62,305, down 40 percent from 2008. The total cotton acreage was 181,280, a drop of 76,290 acres. Most experts predict that the acreage will increase next year.

Due to this continued pattern of declining acreage in the San Joaquin Valley and the resulting funding issues, the Board is considering ways to further reduce operations of the Program.

In 2009, the assessment rates for the San Joaquin Valley Cotton District were set by the Secretary, upon recommendation from the Board, at $6.00 per hundredweight of undelinted cotton seed sold or planted within the District. The assessments are the primary source of income for the Board's testing program and the enforcement of the San Joaquin Valley Quality Cotton District Laws and Regulations.

Welcome to

PEST DETECTION / EMERGENCY PROJECTS

PHOTO CREDIT: CDFA CROP TOUR

INTRODUCTION

The Pest Detection/Emergency Projects Branch (PD/EP) is a component of California's pest prevention system, and has the following overall objective and vision:

Objective and Vision: To initiate and operate programs designed to detect and eradicate exotic pest infestations before the pests become established in California.

California is extraordinarily susceptible to invasive species with the increased risks associated with the number of international passengers and the amount of cargo entering the State. California maintains 11 seaports that handle over 32 percent of our nation's trade. Over the last 20 years, the ocean-going cargo container traffic at the Port of Los Angeles has increased more than 700 percent (from 1,300,000 containers per year to over 10,000,000 containers annually). Passenger traffic at Los Angeles International Airport has increased by 10,000,000 passengers over the last 10 years (Los Angeles Department of Airports website).

New pest pathways and escalating pest pressures go hand-in-hand with the State's rising population and the upsurge in the movement of goods and materials into the State. Global trade brings a host of unwanted pests that compromises the pest prevention system. The Pest Detection and Emergency Projects (PD/EP) branch's role in the California Department of Food and Agriculture's (CDFA) pest prevention system is to detect exotic insects as soon as possible after their introduction into the State. The branch operates a statewide detection trapping program, conducts special detection surveys and maintains teams of emergency projects responders.

Through the early detection of exotic plant pests, PD/EP increases the potential for eradication by minimizing the size of the area that needs to be treated. The detection system is designed to find insect pests before they infest one square mile or more and plant diseases before they infest one-half of a square mile. This approach also reduces the impact on the public and the environment by avoiding large area treatment programs. Consistent with this goal, staff develops specific action plans for eradicating pest infestations. These action plans outline the necessary steps for eliminating the most serious pests that may require regulatory action.

PEST DETECTION

Pest detection is the second line of defense, after the Border Protection Stations (BPS) and the Customs and Border Protection (CBP), against the permanent establishment of exotic insect pests and plant diseases. Despite regulations, point of entry inspections, and best practices to keep exotic pests out of the State, non-native pests continue to invade California. Exotic insect pests have an enormous host range and are difficult and costly to manage once established in an area. Exotic insect pests are very difficult to eradicate, especially in the California environment where the climate is similar to their native habitat and where their natural predators are not present. Additionally, California offers a

Key Highlights in 2009

- Six infestations of exotic fruit flies were successfully eradicated.
- The white striped fruit fly (WSFF) was detected in Los Angeles County. This is the first time WSFF was detected in North America.
- The European grapevine moth (EGVM) was detected in Napa County. This detection represents the first detection in North America.
- The Asian citrus psyllid (ACP) was detected in Orange and Los Angeles counties for the first time.
- PD/EP hosted the Annual Western Region Gypsy Moth Review,

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wide variety of ecological niches where invasive pests can become quickly established.

Early detection protects more than agriculture. Limiting the need for pesticide applications protects the environment as less pesticide is released into the environment.

Statewide Trapping

California's moderate, Mediterranean climate, coupled with the State's fertile soil and diverse land resources, allows year-round production of many commodities. A great number of crops in California would be threatened by the introduction of exotic pests. Additionally, California's climate is also very hospitable for many invasive pests because they are not known to be established in California and do not have any natural enemies to keep their population in check. Early detection is the key to preventing large infestations and possible establishment of exotic pests.

The foundation of the detection program is a statewide trapping program. The Branch administers the statewide detection trapping program through trapping contracts with 47 county departments of agriculture. State personnel maintain the trapping programs in Marin, Mendocino, Orange, Riverside, San Francisco, Santa Barbara, Santa Clara, Ventura and Yuba counties.

The statewide trapping network employs over 119,000 traps, targeting many federal-actionable pests, including exotic fruit flies, Japanese beetle and gypsy moth (Table 1 and Figures 1, 2 and 3).

Quality control inspections emphasizing correct trap placement, host selection, timeliness of inspections, record keeping and the ability to identify target insects are performed by PD/EP entomologists on all trapping programs to ensure that they are biologically sound as referenced by the Branch's Insect Trapping Guide.

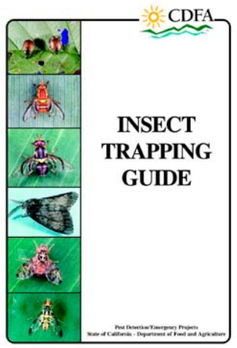

Table 1. Numbers of Exotic Insect Traps by Trap Type and Lure

Trap Type	Jackson	Jackson	Jackson	McPhail	ChamP	Gypsy Moth	Japanese Beetle
Targeted Pest	Mediterranean Fruit Fly	Oriental Fruit Fly	Melon Fly	Exotic Fruit Flies	Exotic Fruit Flies	Gypsy Moth	Japanese Beetle
Number of Traps	24,836	20,550	20,502	19,846	2,527	17,177	13,578

Exotic Fruit Fly Program

Due to California's moderate climate, availability of host plants, agricultural and residential plantings, international trade patterns and culturally diverse population demographics, the risk of introduction of exotic fruit flies in the State is very high. The California exotic fruit fly detection program is a cooperative effort between PD/EP, the United States Department of Agriculture (USDA) and the California county agricultural commissioners. The detection program is designed to trap new introductions of target flies as they occur before they become breeding populations. This trapping program provides assurance to California's trading partners that the State is free from these economically damaging pests.

The development of species specific lures allows for a variety of trap types in combination with different attractants. During the 2009 trapping season, there were over 88,000 exotic fruit fly traps in place for detection monitoring (Table 1).

Exotic Fruit Fly Detections in 2009

In 2009, there were 84 exotic fruit fly adults representing eight species captured in 10 California counties (Table 2 and Figures 4 through 7). These detections triggered 29 delimitation trapping programs and 11 eradication projects.

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Table 2. Exotic Fruit Flies Detected

Pest	County	Number Detected	Total by Species
Anastrepha ludens Mexican fruit fly	Sacramento	1	1
Bactrocera albistrigata White striped fruit fly	Los Angeles	8	8
Bactrocera correcta Guava fruit fly	Los Angeles	6	16
	Orange	7	
	San Mateo	1	
	Santa Clara	1	
	Ventura	1	
Bactrocera dorsalis complex Oriental fruit fly	Alameda	1	25
	Los Angeles	14	
	Orange	2	
	Riverside	1	
	Sacramento	4	
	San Bernardino	2	
	Santa Clara	1	
Bactrocera scutellata Striped fruit fly	Los Angeles	9	9
Bactrocera zonata Peach fruit fly	Orange	1	1
Ceratitis capitata Mediterranean fruit fly	Los Angeles	3	24
	San Diego	21	
		Total	84

Figure 1. Statewide Distribution of Medfly and General Purpose Fruit Fly Traps

Figure 2. Statewide Distribution of Cuelure and Methyl Eugenol Fruit Fly Traps

Figure 3. Statewide Distribution of Gypsy Moth and Japanese Beetle Traps.

Figure 4. Exotic Fruit Flies Detected in the Los Angeles Basin

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Figure 5. Exotic Fruit Flies Detected in the Bay Area

Figure 6. Exotic Fruit Fly Detections in Northern California

Figure 7. Exotic Fruit Flies Detected in San Diego County

GYPSY MOTH PROGRAM

The gypsy moth is the most destructive insect, attacking hardwood forest and shade trees in Europe and the eastern United States. Gypsy moth larvae generally prefer oaks, but may feed on several hundred different species of trees and shrubs. The gypsy moth would be a major threat to California forests and urban forests.

The Asian gypsy moth (AGM), a voracious pest of trees, is a race of this species that occurs in Eastern Europe and Asia. AGM is not known to be established in North America. An introduction of AGM into California would pose a major threat, as the female AGM is an active flyer, capable of flying up to 25 miles. CDFA's Pest Exclusion and PD/EP branches along with the USDA and county agricultural commissioners have prevented the establishment of these pests in California through detection and treatment programs.

Gypsy Moth Detection

During the 2009 season, 17,177 traps were deployed to monitor gypsy moth (GM) and Asian gypsy moth (AGM) introductions as part of California's program to detect and delimit new GM and/or AGM infestations. Traps are placed in urban and in rural residential areas of the State where there are 300 or more homes per square mile. Trap density is three traps per square mile in 19 coastal counties, and two traps per square mile in the remaining 39 counties. California ports receiving shipments from Russia, the Far East and Japan have traps deployed at the rate of 25 traps per square mile in a one-mile buffer around each port.

During the 2009 season, three gypsy moths were trapped (Table 3, Figure 8) in two counties. All specimens were analyzed for possible AGM identification using the mitochondrial DNA test as well as the FS1 Nuclear DNA test. There were two AGM detected in 2009.

Table 3. Gypsy Moths Detected

County	City	Number Trapped	Determination
Los Angeles	San Pedro	1	AGM
	Wilmington	1	AGM
Santa Clara	Los Gatos	1	GM

For European gypsy moth (GM) detections, additional traps were placed at the rate of 25 per square mile in a four square mile area surrounding the detection sites. For the AGM detections, 49 traps were placed in the core square miles and 25 traps per square mile were placed in the remaining 4.5 mile radius around the detection sites.

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Figure 8. Gypsy Moth Trap detections

Figure 9. Asian Gypsy Moth Detections

2009 Delimitation Trapping

Due to the life cycle of the GM, two years of negative trapping for the adult moth is required to declare an area free from GM. Therefore, GM detections from the 2008 season were delimited again in 2009.

Table 4. Gypsy Moth Delimitation Trapping Results from Detections in 2008

County	City	2008 Detection Results	2009 Detection Results
Alameda	Oakland	1	0
Los Angeles	Carson	1	0
Orange	Irvine	1	0
Placer	Dutch Flat	1	0
Ventura	Ojai	7	0
	Total:	11	0

JAPANESE BEETLE PROGRAM

The Japanese beetle (JB) is a serious pest of turf, crops and ornamental plants. This pest is established in the eastern United States. The four parts of this program are: high hazard trapping, statewide JB detection trapping, aircraft inspection and air cargo facility trapping.

Japanese Beetle

Aircraft originating from east of the Mississippi River are a high-risk pathway for the introduction of JB. This is supported by the large number of beetles collected on aircraft from infested states. The Branch prevents the establishment of JB through its aircraft inspection program and the statewide deployment of traps.

Japanese Beetle Detection

In 2009, there were 13,578 JB traps deployed throughout the urban and high-risk areas of the State. Of these, 4,424 were deployed at the 14 airports where inspections were performed.

The trap density for statewide JB detection is two traps per square mile (Figure 3). A high-density trapping array is deployed in a one-mile buffer around each airport and at transfer/sorting facilities used by air cargo and express mail carriers. There was one JB trapped in proximity to the Los Angeles International Airport, with no JB trapped in residential areas.

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Aircraft Inspections

During the summer when adult JB are active, an intensive aircraft inspection program is implemented. The program is designed to find and remove JBs hitchhiking in aircraft before they escape from the aircraft and enter the surrounding environment. Inspections yielded the interception of 56 JBs, of which five were alive (Table 5).

Table 5. Number of Aircraft Inspected and Beetles Collected by Airport

County	Airport	Number of Aircraft Inspected	JB Collected		
			Alive	Dead	Total
Alameda	Oakland International	346	2	12	14
Los Angeles	Burbank	157	0	8	8
	Long Beach	226	0	4	4
	Los Angeles International	2,481	2	3	5
Orange	John Wayne	250	0	4	4
Sacramento	Mather	240	0	2	2
	Sacramento International	85	0	0	0
San Bernardino	Ontario	822	1	14	15
San Diego	Lindbergh Field	1,904	0	4	4
San Francisco	San Francisco International	198	0	0	0
Santa Clara	San Jose International	69	0	0	0
	Total:	6,778	5	51	56

ADDITIONAL INSECT SURVEYS

County Commitment

The county agricultural commissioners maintain additional detection traps over and above those funded through pest detection contracts with PD/EP. The types of traps deployed target those pests that pose a risk to their counties. These include:

European Corn Borer

European corn borer (ECB) is a major pest of corn and can infest a wide variety of herbaceous plants. European corn borer is known to feed on 250 plants. Since its introduction, it has become established in most of the states east of the Rocky Mountains. Typical damage to corn plants caused by this insect is reduced plant vigor, leading to subsequent ear drop and stalk lodging. The 2009 survey was negative for ECB in California.

European Pine Shoot Moth

European pine shoot moth is a destructive pest of ornamental, Christmas tree and timber pines. In the United States, this insect pest currently infests Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Washington, West Virginia and Wisconsin. As a result of the feeding damage, trees will have dead and stunted shoots. Infested trees are bushy and distorted. The 2009 survey was negative for the presence of European pine shoot moth in California.

Khapra Beetle

Khapra beetle (KB) is the world's most destructive pest of many stored grains and grain products. The KB is not known to occur in the United States. If left uncontrolled, the insect can make the surface of a grain storage facility appear alive with crawling larvae. They not only consume the grain, but may also contaminate it with body parts, which are known to cause adult and especially infant gastrointestinal irritation. Branch entomologists, in conjunction with county staff, deployed and inspected 2,434 traps in 26 counties to guard against an introduction of this pest. The 2009 survey was negative for the presence of KB in California.

The United States Department of Agriculture and United States Customs and Border Protection Service at the Port of Oakland intercepted a KB from a shipment of coriander seed from India. The coriander seeds and all the other contents of the container were secured and were shipped out of California by sea carrier. In response to this detection, Branch staff deployed KB traps at the port facility to determine if any KB escaped into the environment. No Khapra beetles were detected and the traps were removed in December.

Spotted Wing Drosophila

In May, the University of California Extension Service submitted a sample of a *Drosophila* species larvae found in the flesh of cherries. The reports noted that the larvae were found in ripe but undamaged fruit. Infestation of undamaged fruit is unusual for this genus, and is not known to occur in native species. Larvae were reared to adults and were identified as *Drosophila suzukii*, spotted wing drosophila (SWD), by CDFA Insect Biosystematist, Dr. Martin Hauser. The identification of adults was corroborated by the Systematic Entomology Laboratory in Washington, D.C.

Spotted wing drosophila (SWD) damage occurs when female flies deposit eggs into the fruit, which hatch into maggots that feed on the fruit. In California, damage has been reported on cherries, strawberries, raspberries and blueberries.

This was the first reported detection of this fly in the continental United States. Staff that monitor

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exotic fruit fly traps were instructed to look for SWD in their traps. SWD was confirmed from 23 counties. In the United States, SWD has been detected in Hawaii, Washington, Oregon and Florida.

European Grapevine Moth (EGVM)

In October 2009, the EGVM was detected in Napa County. This detection represents the first detection of EGVM in North America. The United States Department of Agriculture (USDA), Plant Protection and Quarantine (PPQ) has listed EGVM as reportable/actionable and is also listed on their Regulated Plant Pest List. According to the USDA, EGVM has two main hosts, grapes and olives, as well as many other minor hosts. EGVM is an important pest of grape, in which losses of 80 percent have been reported. Young larvae can penetrate grape berries; hollows them out leaving the skin and seeds. This causes direct damage to the berry and predisposes the grape clusters to fungus infection (mold).

European Grapevine Moth Larval Damage

Following the detection of the EGVM, additional traps were placed throughout the Napa area in the fall. A visual survey was also initiated. Additional EGVM were detected at over 30 locations; because EGVM diapauses during the winter, the traps were removed and will be re-deployed in early spring of 2010.

COOPERATIVE AGRICULTURAL PEST SURVEYS (CAPS)

The primary function of Cooperative Agricultural Pest Surveys (CAPS) is to survey, identify and monitor for pests of concern to U.S. agriculture and plant resources. CAPS program objectives are to: detect exotic pests before they become well established; facilitate the export of agricultural products; collect and manage survey data. Through the CAPS program, PD/EP surveyed for the following exotic pests: Asian gypsy moth, potato cyst nematode, citrus canker, Huanglongbing or yellow shoot disease, cereal leaf beetle and false codling moth. The PD/EP Branch assisted the Integrated Pest Control Branch with the exotic woodboring beetle and the red bay ambrosia beetle survey.

PD/EP staff also participates in the inspection of plant shipments coming into California for diseases as part of the postentry quarantine program.

Asian Gypsy Moth (AGM) and Other Exotic Moths

High Risk Port Trapping

Eight deep water ports in Alameda, Humboldt, Los Angeles, Sacramento, San Diego, San Francisco, San Joaquin (delta) and Ventura counties were trapped in a one-mile radius surrounding the ports at a density of 25 traps per square mile. Deep water ports present a high risk for AGM introduction, as ships from Asian and Russian ports frequently carry AGM egg masses. These egg masses can hatch at or near United States ports, allowing larvae to be blown onshore. There were 1,809 traps placed in the aforementioned counties. In Los Angeles County, two AGMs were detected near the Port of Los Angeles. All traps were negative for any other exotic moths.

AGM Delimitation Activities

In response to AGM detections in 2007 and 2008, delimitation trapping for AGM occurred in the cities of San Pedro, Long Beach, Rolling Hills Estates and Los Angeles. Traps were deployed at a rate of 49 traps in the core square mile surrounding the detection site, and 25 traps per square mile in a 4.5-mile radius around the detection site square mile. Two AGM were detected near the Port of Los Angeles (see High Risk Port Trapping). Trapping will continue in 2010.

Cereal Leaf Beetle Survey

Cereal leaf beetle (CLB) can cause considerable damage to barley, oats, wheat and rye. The CLB feeds on plant foliage, resulting in elongated, slender slits in the upper leaf surface. This damage can significantly reduce grain yield and quality. This beetle infests a number of other states. Branch entomologists conducted sweep net surveys at 1,651 sites in 56 counties to monitor for this pest. The 2009 survey was negative for the presence of CLB in California.

False Codling Moth

The false codling moth (FCM) is one of the most important pests of citrus and cotton in sub-Saharan Africa. The larvae of this moth infest a wide variety of fruits, vegetables and forest trees, but cause the most damage to citrus and cotton. The citrus industry alone in California produces in excess of $1.8 billion in agricultural value for the State, and citrus is widely planted at residences throughout the State. Detections in 2002 and 2005 of live larvae entering California via citrus imported from South Africa demonstrate a continuing pathway for entry.

One FCM was trapped on July 24, 2008, in Port Hueneme in Ventura County. This discovery was a new record for the Americas. In response to this detection, a delimitation trapping array consisting of 481 traps was deployed around the detection site. The traps were inspected every

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two weeks. This delimitation trapping array remained in place for three generations of the pest with no additional adult moths detected.

In 2009, a detection survey occurred in 33 counties. There were 933 traps placed in host trees from June through December. All traps were negative for FCM.

Citrus Commodities

This survey is for a series of diseases and their vectors that affect citrus. Staff plant pathologists surveyed for the following: citrus canker, Huanglongbing (HLB) or yellow shoot disease, Asian citrus psyllid, citrus variegated chlorosis and brown citrus aphid. Annually, 25 percent of the commercial citrus acreage is surveyed for the presence of these diseases and insect vectors. In addition to these surveys, yellow panel traps were placed at packing houses receiving citrus from countries known to be infested with Asian citrus psyllid, as well as around airports and markets that have received commodities from areas that are infested with live Asian citrus psyllid.

Sweep Netting for Citrus Pests

This survey occurred in 35 counties throughout the State. Entities that are surveyed include commercial citrus groves, nurseries that sell citrus plants or *Murraya paniculata*, citrus production nurseries, retail stores, ethnic grocery stores that sell curry leaves and high risk urban areas (Table 6).

In 2009, 1,533 samples were submitted for HLB, citrus canker and citrus variegated chlorosis. All samples were negative for these diseases.

Table 6. Statewide Citrus Commodities Survey Summary

District	Commercial Citrus (Acres)	Residential	Citrus Nursery	Ornamental Nursery	Retail Stores	Survey Traps	Samples	Results
Northern	793	816	4	1	163	178	175	Negative
Central	62,730	393	36	22	0	268	151	Negative
Southern	13,208	1,509	9	91	0	23	1,207	Negative
Total	**76,731**	**2,718**	**49**	**114**	**163**	**469**	**1,533**	**Negative**

Karnal Bunt

Karnal bunt is a fungal disease of wheat, durum wheat, rye and triticale. The causal agent of Karnal bunt is *Tilletia indica*. This pathogen infects wheat seed at the time of flowering. CDFA plant pathologists in conjunction with the USDA and the affected counties performed the survey in eastern Riverside County and in a small portion of Imperial County. Statewide, 23 counties participated in a voluntary survey for Karnal bunt. During the 2009 wheat harvest, a total of 56 samples were collected from 24 counties. All fields were negative for Karnal bunt.

Potato Cyst Nematode (PCN) Survey

Due to the detection of PCN in Idaho in 2006, the USDA requires a national survey of all certified seed potato fields. The objective of the nematode survey is to obtain current information on the occurrence and distribution of the PCN. These nematodes are parasites of over 90 species of solanaceous plants, such as potato, tomato and eggplant. Additionally, approximately 10 percent of the potato production fields were sampled.

There were 3,702 soil samples submitted to the CDFA Plant Pest Diagnostic Center for identification (Table 7). All samples were negative for PCN; however, the C-rated cabbage cyst nematode, *Heterodera cruiferae*, was detected from a field in Santa Barbara.

Table 7. Potato Cyst Nematode Survey Data

County	Number of Soil/ Samples Processed		Total
	Seed Potato	Production Potato	
Kern	417	2,340	2,757
Marin	0	2	2
Modoc	0	366	366
San Benito	0	11	11
San Joaquin	251	0	251
San Luis Obispo	80	0	80
Santa Barbara	152	0	152
Siskiyou	0	40	40
Sonoma	0	23	23
Yolo	0	20	20
Total	**900**	**2,802**	**3,702**

EMERGENCY PROJECTS

OTHER SURVEYS

Statewide Postentry Quarantine Program

The Postentry Quarantine Program is a cooperative federal-state undertaking. By agreement, state plant pathologists and entomologists with specialized training perform field inspections of postentry quarantine material (e.g., plant stock, plant cuttings, bulbs). The purpose of the program is to conduct a survey of the growing site to determine whether to approve the site for placement of plant materials and to inspect postentered plant material during the growing period for pests. In 2009, PD/EP staff inspected 128 shipments of various plants in 23 counties.

EMERGENCY PROJECTS

The PD/EP Branch provides the Division of Plant Health and Pest Prevention Services first response resources for combating introductions of catastrophic plant pests and diseases. Responding to a new pest or disease is similar to responding to a fire in that if the response is immediate, it is more effective, less damaging and substantially less costly.

The most important element of a successful response involves timing. Pests and diseases damage plants and animals at an exponential rate over time. Further, if eradication is not possible and the pest becomes established in a significant population, such as animal pests in wildlife or wilderness and exotic fruit fly pests in urban environments, pest becomes more difficult to control and control costs increase.

Early detection of incipient invasions and quick coordinated responses are needed to eradicate or contain invasive species before they become too widespread and control becomes technically and/or financially burdensome or, in some cases, impossible. To accomplish this, PD/EP maintains a Pest Response Team (PRT) that is trained in delimitation trapping, larval survey and treatment operations. Teams respond to infestations anywhere in the State within 24 hours. Action plans for specific pests have been developed by PD/EP scientific staff, scientists from other cooperating agencies and universities.

Eradication Programs

Oriental Fruit Fly Complex

The oriental fruit fly complex comprises 68 species with varying distributions in Asia, Australia and the Pacific Islands. This complex is recognized as one of the most damaging fruit fly pests in the world due to its very wide host range, high reproductive potential, high mobility and adaptability to climate. This complex attacks over 230 different kinds of fruit. Two species have become established in Hawaii (*Bactrocera dorsalis*) and northeastern South America (*Bactrocera carambolae*), greatly increasing the risk of introduction into California.

There were two eradication programs that were initiated in 2009 and six programs that began in 2008 and were completed in 2009 for the oriental fruit fly complex of flies (Table 8). One quarantine area was established in La Verne (Los Angeles County). The primary treatment method for this group of flies is male attractant technique, which consists of applying a minimum of 600 methyl eugenol (lure) mixed with insecticide bait stations per square mile every two weeks for two generations of the fly. Eradication has been declared for six of the eight infested areas. The other two eradication projects are still in progress.

Table 8. Oriental Fruit Fly Complex Eradication Projects

County	City	Number Trapped	Treatment Area (square miles)	Eradication Status
Los Angeles	La Verne	6	14	In progress
	San Marino[1]	2	13	Eradicated
	Lakewood[1]	18	22.5	Eradicated
Sacramento	Elk Grove	3	7.3	In progress
San Bernardino	Loma Linda[1]	2	9	Eradicated
	Ontario[1]	4	18.5	Eradicated
San Diego	Carlsbad[1]	2	8.2	Eradicated
Santa Clara	Santa Clara/San Jose[1]	4	10.6	Eradicated
	Total:	41	103.1	

Guava Fruit Fly

The guava fruit fly is an exotic insect which is widely distributed in Southern Asia occurring from Pakistan eastward through India to Thailand. In India, this fly is a serious pest of a variety of tree fruits. Important California crops which would be infested include stone and pome fruits, especially peaches and various types of citrus. Damage occurs when the female lays eggs in the fruit. These eggs hatch into larvae, or maggots, which tunnel through the flesh of the fruit, making it unfit for consumption. The first Western hemisphere infestation of this pest was detected in Garden Grove, Orange County, in 1986 and was successfully eradicated. Since that time, several infestations have been delimited and successfully eradicated.

Multiple guava fruit flies were detected in the Santa Ana/Garden Grove area of Orange County and in Calabasas in Los Angeles County that resulted in eradication projects. PD/EP pest response team members applied bait stations in these areas for two life cycles (Table 9).

EMERGENCY PROJECTS

Table 9. Guava Fruit Fly Eradication Projects

County	City	Number Trapped	Treatment Area (square miles)	Eradication Status
Los Angeles	Calabasas	2	16.5	In progress
Orange	Garden Grove/Santa Ana	7	13.5	In progress
	Santa Ana[1]	2	12	Eradicated
	Total:	11	42	

[1]Program began in 2008 and continued in 2009.

White Striped Fruit Fly

Whited Striped Fruit Fly

The white striped fruit fly (WSFF) is an exotic insect which is native to tropical southeast Asia, occurring from southern Thailand into Malaysia and Indonesia, and on the Andaman and Nicobar Islands, Christmas Island, and probably Irian Jaya. It is known to attack the fruit of a number of trees, most significantly guava and mango. In July, WSFF was detected in the city of La Verne. This was the first Western Hemisphere infestation of this pest.

The primary treatment method for the WSFF is the male attractant treatment. This involved the placement of bait stations containing a mixture of cuelure and naled housed within special insect traps. There were 1,000 traps per square mile placed in 15 square miles. The male WSFF is attracted to the bait station and is eradicated before they can mate with the female WSFF. This disrupts the breeding cycle and the population is eliminated. Additionally, foliar bait ground treatments that consisted of an organic formulation of spinosad was applied to all host plants 200-meters around each detection site. Larval survey occurred up to 200-meters around any property where WSFFs were trapped to determine if other life stages were present. No immature WSFFs were detected. This infestation was eradicated.

Mediterranean Fruit Fly Larvae

Mediterranean Fruit Fly

The Mediterranean fruit fly (MDFF) is native to Africa, and has spread to southern Europe, Australia, Hawaii, and Central and South America. The MDFF is arguably the world's most threatening pest affecting the food supply. The MDFF attacks more than 260 different types of fruit, vegetables and nuts. When host fruit is continuously available and weather conditions are favorable for many months, successive generations of the MDFF will be large and continuous. In California, it is likely that the MDFF will establish a permanent presence in the State if it is not eradicated. The damage occurs when the female MDFF lays eggs in the fruit. The larvae that hatch from the eggs tunnel their way through the fruit, decay organisms enter, leaving the fruit a rotten mass and unfit for human consumption.

California is at risk of becoming permanently infested by the MDFF due to the State's proximity and ties to MDFF-infested regions of the world and our status as the world's leader in agricultural production. Because the MDFF is not known to be established in California, it does not have any natural enemies to keep its population in check.

In 2009, one MDFF infestation was detected in Los Angeles County and five infestations were detected in San Diego County. The MDFF infestation in El Cajon (San Diego County) that started in 2008 was declared eradicated in 2009 (Table 10). Eradication activities included spinosad applications in a 200-meter radius around each MDFF detection site for one life cycle, sterile MDFF release, larval survey and fruit removal. Fruit infested with MDFF larvae was removed from 100-meters around each larval detection site.

Table 10. Mediterranean Fruit Fly Eradication Projects

County	City	Number Trapped	SIT Area (square miles)	Properties Under Ground Treatment	Fruit Removed (pounds)
Los Angeles	Santa Monica	3	9	126	5,607
San Diego	Escondido	7	44	788	4,080
	Fallbrook	4	9.35	206	51,422
	Imperial Beach	1	13	139	0
	Mira Mesa	6	102	335	1,795
	Spring Valley	2	25.2	147	0
	El Cajon	21	51	659	2,973
	Total:	44	253.55	2,400	65,877

Mexican Fruit Fly

The Mexican fruit fly (MXFF) is an exotic insect native to central Mexico. The conversion of large areas of native vegetation to agriculture and the subsequent artificial movement of host fruit within Mexico have resulted in a significant range expansion of the MXFF during the past century. In Mexico, the MXFF attacks over 40 different types of tropical and cultivated fruits, favoring citrus and mango. Important California crops which would be damaged by the introduction of this pest include peach, pear, grapefruit and orange.

In December 2008, four MXFFs were detected in the city of Azusa in Los Angeles County (Table 11), initiating an eradication project. Foliar ground treatment with spinosad was applied for 200 meters around each detection site. Fruit was cut in a 200-meter radius around each detection

EMERGENCY PROJECTS

site for the presence of larvae. Fruit was also removed from all host trees in a 100-meter radius around a detection site where an adult mated female was detected. Sterile MXFFs were released over 12.3 square miles at the rate of 750,000 MXFFs per square mile per week. This infestation was eradicated.

An infestation in Azusa, Los Angeles County, was declared eradicated in July. This concluded this program that began in December 2008. There were no MXFF eradication projects in 2009.

Ground Treatment with an Organic Pesticide

Table 11. Mexican Fruit Fly Eradication Projects

County	City	Number of MXFFs Detected	SIT Area (square miles)	Properties Under Treatment	Fruit Removed (pounds)
Los Angeles	Azusa[1]	4	12.3	391	6,321
	Total:	**4[1]**	**12.3**	**391**	**6,321**

[1]Project began in 2008 and completed in 2009.

Gypsy Moth

The gypsy moth (GM) is an exotic pest not known to occur in California. The gypsy moth is a voracious pest of trees. The goal of the GM program is to identify likely pathways for entry of this exotic pest and maintain an early detection program. An introduction into California would pose a major threat to the forest habitats as well as urban landscaping.

In 2007, four gypsy moths were trapped at a single property in Ojai, Ventura County. In 2008, seven additional adult gypsy moths were detected at four sites. Two egg masses were discovered during a survey that occurred in fall 2008. These finds triggered an eradication program in March 2009. Prior to the start of the treatment program, CDFA proactively initiated an outreach campaign, partnering with the Ventura County Agricultural Commissioner's Office, the Office of Environmental Health Hazard Assessment, U.S. Forest Service, the USDA, California Department of Pesticide Regulation and other local agencies. Despite these efforts, the program was not without opposition from a small group of residents. Through extended outreach and legal actions, all of the properties were treated according to established protocol.

Three biweekly treatments were applied to the foliage of all trees and shrubs in a 400-meter radius around adult gypsy moth and egg mass find sites using *Bacillus thuringiensis var. kurstaki* (Btk) (Figure 10). The first treatment began in March 2009 with treatment completed by late-April. A total of 584 properties received treatments. Post-treatment delimitation trapping yielded no GM in 2009. Trapping will continue through the 2010 trapping season to ensure eradication is achieved.

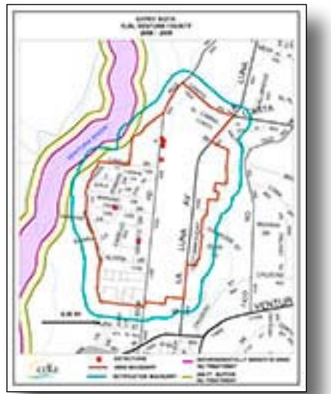


Figure 10. 2009 Gypsy Moth Treatment Area – Ventura County

MULTI-YEAR ERADICATION PROJECTS

Asian Citrus Psyllid

The Asian citrus psyllid (ACP) is an exotic pest that is originally from Asia. It has been introduced into Central and South America, the Caribbean and Mexico. In the United States, ACP has been found in Alabama, Florida, Georgia, Hawaii, Louisiana, Mississippi, South Carolina, Texas and California. The ACP feeds on members of the Rutaceae, primarily on *Citrus* spp. and *Murraya* sp., but is also known to attack several other genera. The most serious damage caused by ACP is due to its ability to effectively vector the phloem-inhabiting bacterium *Candidatus liberibacter* spp. that causes Huanglongbing (HLB). HLB is considered one of the most devastating diseases of citrus in the world. Symptoms of HLB include yellow shoots with mottling and chlorosis of the leaves, misshapen fruit, fruit that does not fully color, and fruit that has a very bitter taste making it unusable for human consumption. The psyllids cause injury to their host plants via the withdrawal of large amounts of sap as they feed and via the production of large amounts of honeydew that coats the leaves of the tree, encourages the growth of sooty mold and blocks sunlight from reaching the leaves. This pest presents a major threat to citrus grown within the State. California is the top citrus producing state in the U.S., with total production valued at over $1.8 billion.

MULTI-YEAR ERADICATION PROJECTS

Since the detection of ACP in San Diego and Imperial counties in 2008, ACP was detected in Orange and Los Angeles counties. In August 2009, a small infestation of ACP was confirmed in Santa Ana (Orange County) and a large infestation was detected in Los Angeles County. These detections resulted in delimitation trapping and treatment 400-meters around the detection sites (Figure 11, Figure 12 and Figure 13). Additionally, treatment and trapping activities continue in San Diego and Imperial counties (Table 12). All host plants are treated with imidachloprid and cyfluthrin.

Table 12. Asian Citrus Psyllid Program Data

County	Number of Detection Sites	Number of Properties Treated
San Diego	134	1,189
Imperial	256	3,351
Los Angeles	680	9,072
Orange	7	534
Total:	**1,077**	**14,146**

Two major components of the treatment program are public outreach and environmental monitoring. Public meetings are held within the treatment areas to inform residents of CDFA activities and answer any questions.

Environmental monitoring ensures the protection of human health and the environment. Sampling media include air, leaf, soil, tank and water.

HLB surveys occur in all of the areas where ACP has been detected. To date, HLB has not been detected in California.

Yellow panel traps were also placed in citrus trees at exotic fruit fly trap sites throughout southern California to determine if ACP is present in these counties (Table 13).

Yellow Panel Trap Placed in a Citrus Tree

Table 13. Asian Citrus Psyllid Detection

County	Number of Traps	Number of HLB Samples	HLB Results
San Diego	5,834	224	Negative
Imperial	3,688	156	Negative
Los Angeles	12,209	478	Negative
Orange	2,721	12	Negative
Riverside	4,319	See citrus commodities survey	
San Bernardino	590	See citrus commodities survey	
Santa Barbara	350	See citrus commodities survey	
Ventura	1,653	See citrus commodities survey	
Total:	**31,364**	**870**	**Negative**

Other ACP Activity

On July 13, a Pest Exclusion canine team working at an air cargo facility, detected one adult ACP and several nymphs on curry leaves that was packed in personal luggage. The dead nymphs tested positive for HLB. Similarly, on August 26, 2009, a canine team in Sacramento intercepted a package at an air cargo facility that contained ACP on plant material. In both instances, delimiting traps were placed around the air cargo facilities and at the destination addresses. No additional ACP was detected.

Red Imported Fire Ant

Since its introduction in the United States, the red imported fire ant (RIFA), *Solenopsis invicta* (Hymenoptera: Formicidae), has become a major agricultural and urban pest in the southeastern states. Because of its venomous sting and aggressive nature, RIFA is also a human health threat. In addition to agricultural problems such as interference of harvesting equipment by ant mounds and damage to young plant growth and fruit tree flowers, RIFA may completely eliminate ground nesting bird species from a given area. The PD/EP branch maintains eradication and regulatory programs against infestations in the Central Valley and parts of Southern California.

Survey Activities

Northern California

A majority of the RIFA infestations can be traced back to out-of-state beehives that are brought into California with hitchhiking RIFA on the pallets the hives are placed on, and within the hives

MULTI-YEAR ERADICATION PROJECTS

themselves. These bee colonies are brought into the State to pollinate the almond blossoms. Therefore, the survey targets almond orchards, specifically the areas where the beehives have been placed within the orchard. Spam® bait are placed systematically throughout the orchard and inspected for RIFA.

General Survey

Approximately 27,000 acres of almonds were surveyed in Kern County and found to be free from RIFA. Nearly 65 percent of all of the almond acreage in the San Joaquin Valley has been surveyed for RIFA (Table 14).

Table 14. Almond Orchard Survey[1] – General Survey

County	Acres Surveyed		Samples Collected		Positive Sites		Cumulative Percent Almonds Surveyed
	Previous	2009	Previous	2009	Previous	2009	
Fresno[2]	114,578	0	28,744	0	10	0	88
Kern	83,333	27,256	15,242	1,580	5	0	82
Kings	8,127	0	1,581	0	0	0	100
Madera	75,820	0	20,258	0	7	0	91
Merced	41,018	0	11,351	0	14	1[3]	43
San Joaquin	3,000	0	1,121	0	1	0	7
Stanislaus	50,836	0	14,091	0	7	0	55
Tulare	1,303	0	1,112	0	0	0	7
Total:	378,015	27256	93,500	1,580	44	1	65

[1] Total almond acreage is 558,328

[2] 41,932 acres in Fresno County were resurveyed. The percent completed does not include the resurveyed acreage.

[3] Detected as a result of a delimitation survey.

Delimitation Survey

Delimitation surveys occurred around the Turlock, Ballico and the newly discovered Cressey infestations. Approximately 6,747 acres were delimited. Because the delimitation survey was not completed in 2009, these are the only areas where untreated RIFA infestations may exist. The delimitation survey will resume in 2010. All other known infested areas in the San Joaquin Valley have either been eradicated or treatment is nearly completed and RIFA may no longer exist.

Treatment Activities

Treatment activities continued in the San Joaquin Valley. All properties were treated with abamectin, pyriproxyfen or methoprene. The total RIFA-infested acreage increased by 2,827 acres as a result of new properties found to be infested in Ballico and Cressey. The total acreage that is being treated in the San Joaquin Valley increased by 304 acres.

The total acreage considered eradicated or that is in the post-treatment monitoring stage increased to 15,676 acres. Seventy-two percent of the acreage that was infested is no longer under a treatment program.

Post-Treatment Survey

Post-treatment survey was conducted primarily in Fresno and Madera counties. A limited amount of post-treatment survey was conducted in Chowchilla. A total of 3,866 acres were surveyed. Five surviving RIFA detections on 335 acres were discovered and treated. Seven properties totaling 712 acres were removed from treatment and will be included in the post-treatment surveys.

Southern California – Orange, Riverside, San Bernardino and Los Angeles Counties

Quarantine Activities

The RIFA quarantine remained unchanged in 2008 from its inception in 1999. Three counties are regulated in the 865.5 square mile quarantine zone: all of Orange (790 square miles), parts of Riverside (67 square miles) and parts of Los Angeles (8.5 square miles). The quarantine is designed to contain the spread of RIFA by requiring inspection and treatment of articles (nursery stock, soil, landscaping and beehives) through which the ant can be spread.

Infestations within the quarantine area are treated to prevent the movement of the ant. Necessary treatments on residential, commercial and public land are applied by County Vector Control Districts in Orange County and in the Coachella Valley (Riverside County). In Los Angeles County, inspectors from the agricultural commissioner's office make the insecticide application.

Regulatory Activities

Regulatory enforcement of the RIFA quarantine was accomplished by issuing compliance agreements to businesses and individuals within the quarantine areas that commercially grow, produce, propagate, handle, store, maintain, ship, transport or process regulated articles and commodities. Establishments that are in the compliance program followed specified treatment procedures necessary to ensure that the commodities intended for movement are free from RIFA.

Program staff issued 154 new compliance agreements, bringing total establishments monitored to 6,166.

PEST PREVENTION PROGRAMS

ESTABLISHED PEST PREVENTION PROGRAMS

Hawaii Fruit Fly Rearing Facility

The Hawaii Fruit Fly Rearing Facility (HFFRF) is the main supplier of sterile Mediterranean fruit fly (MDFF) pupae for CDFA's Preventive Release Program (PRP). The HFFRF is located on the island of Oahu, approximately 30 miles from Honolulu International Airport. Due to the HFFRF's close proximity to the airport, pupae are immediately transported there and placed on a flight to Los Angeles. This minimizes the amount of time the MDFF pupae are in hypoxia and therefore provides for a very high quality sterile MDFF. Overall, the facility produced sterile male MDFFs with 86 percent of the pupae emerging as adults and 81 percent were able to fly following emergence from the pupal case. The facility operates daily (7 days a week, 365 days a year) to meet the demands of the PRP. In 2009, the facility shipped over 160 million pupae per week.

Quality Control Tests

Mediterranean Fruit Fly Preventative Release Program

The preventative release of sterile MDFFs over nearly 2,500 square miles of the greater Los Angeles Basin is the primary mission of the Mediterranean Fruit Fly Preventative Release Program (PRP). The goal is to prevent the MDFF from infesting the Los Angeles Basin. The PRP is the largest fruit fly program using sterile insect technique (SIT) in the United States.

The PRP is a cooperatively-funded and administered program between the USDA and CDFA. The PRP began in July 1996 following a successful two-year area wide release of sterile MDFFs to eradicate existing populations of MDFFs in the Los Angeles Basin. The PRP uses continuous releases of sterile MDFFs to prevent MDFF colonization throughout the Los Angeles Basin, including major portions of Los Angeles, Orange, Riverside and San Bernardino counties.

David R. Rumsey Emergence and Release Facility

Each week, 310 million sterile Mediterranean fruit fly pupae are delivered to the David R. Rumsey Emergence and Release Facility located on the Joint Forces Training Base (JFTB) in Los Alamitos. The sterilized pupae are shipped via air freight daily, throughout the year, from production facilities operated by CDFA in Hawaii and the USDA in Guatemala. Four days after the sterile MDFFs are received as pupae, they are released as adult flies from fixed wing aircraft over the Los Angeles Basin.

The standard rate of release is 62,500 sterile male flies per square mile per week, with a higher rate of 125,000 sterile male MDFFs being released in a historically high-risk area encompassing 250 square miles in central Los Angeles. A typical week features 56 missions flown over 15,000 linear miles to release 200 million sterile MDFFs.

To date, the PRP has been highly successful, resulting in a 97 percent reduction in the number of MDFF infestations in the Los Angeles Basin since the beginning of the preventive releases. After completing 13 years of the program, a total of 166 billion sterile MDFFs have been released during 31,925 flight missions traveling over 8,004,000 linear miles.

Current Sterile Insect Technique Programs

All MDFF and MXFF Sterile Insect Technique (SIT) eradication programs in California are based out of the Los Alamitos facility. In addition to regular releases over the Los Angeles Basin, in 2009 the PRP made eradicative releases of sterile MDFFs over communities in San Diego and Los Angeles counties. Additionally, sterile MXFFs were released over Azusa to eradicate an infestation (Table 15).

Table 15. Additional SIT Flights Due to Eradication Projects

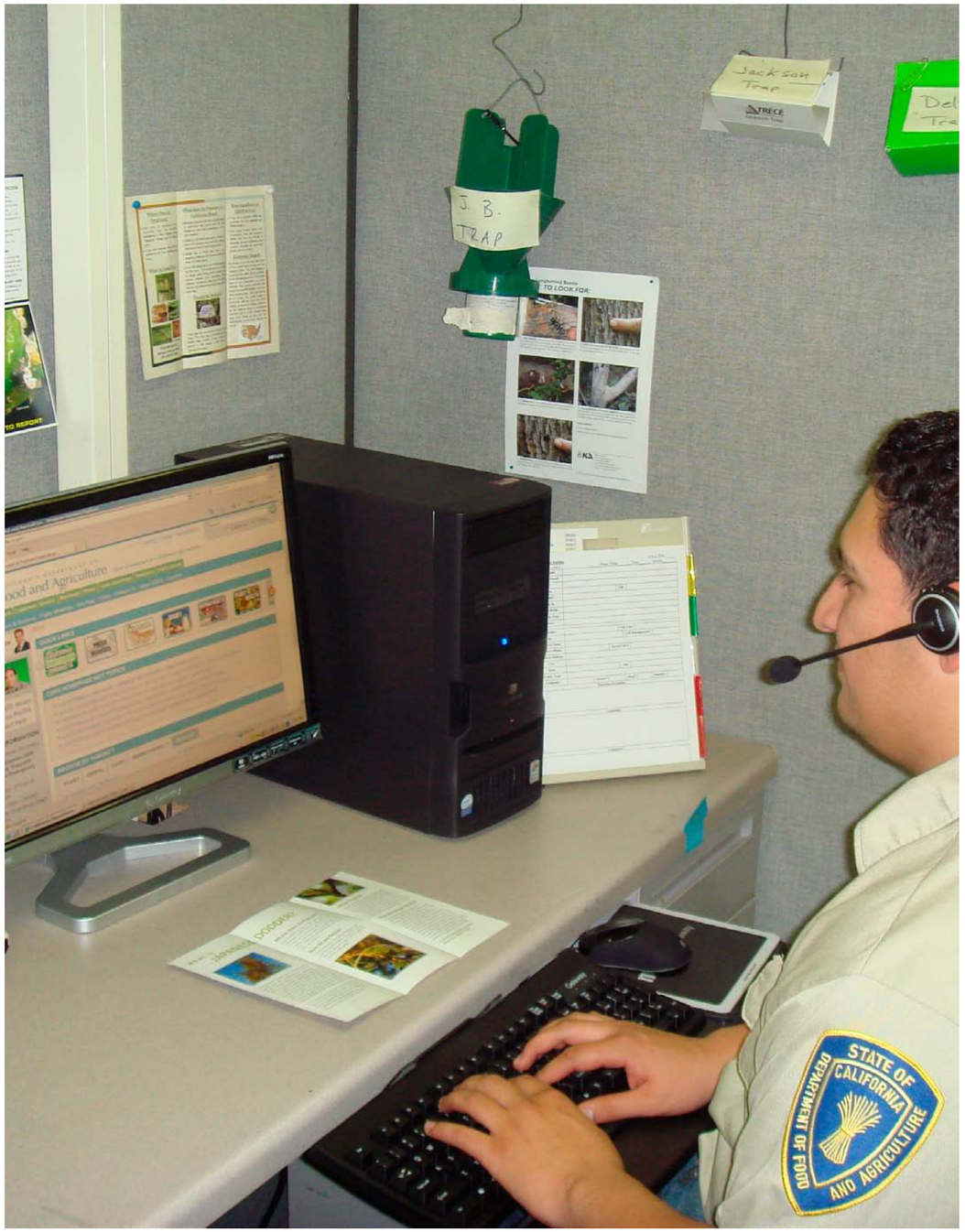
County	Location	Type of Fly	Linear Miles	Flights per Week
San Diego	El Cajon	MDFF	9,256	2
	Escondido	MDFF	2,841	2
	Fallbrook	MDFF	579	2
	Spring Valley	MDFF	2,349	
	Mira Mesa	MDFF	8,248	4
	Imperial Beach	MDFF	466	2
Los Angeles	Santa Monica	MDFF	756	2
	Azusa	MXFF	2,544	5
		Total:	27,039	19

CDFA Exotic Pest Call Management System

The Exotic Pest Call Management System (CMS) is a toll-free telephone number, accessible statewide, providing information regarding current programs to the public with maximum efficiency. A menu driven format is available to any caller who wants to obtain information regarding CDFA activities. If the caller wants to talk to an attendant, this can be done as well. This information is recorded by an operator and entered into an Internet database. In 2009, the CMS received 3,975 calls from the public (Table 16).

Table 16. Calls to the Exotic Pest Call Management System

Pest	Calls Received
African Honey Bee	18
Asian Citrus Psyllid	2,172
Asian Gypsy Moth	15
Asian Longhorned Beetle	9
Avian Health Program	5
Diaprepes Root Weevil	157
False Codling Moth	2
Gladiolus Rust	10
Glassy Winged Sharpshooter	1
Guava Fruit Fly	70
Gypsy Moth	227
Huanglongbing	34
Japanese Beetle	31
Japanese Dodder	51
Light Brown Apple Moth	202
Mediterranean Fruit Fly	284
Mexican Fruit Fly	27
Oriental Fruit Fly	28
Other (Non-related)	128
Other (Related)	113
Red Imported Fire Ant	270
West Nile Virus	1
White Striped Fruit Fly	120
Total	**3,975**



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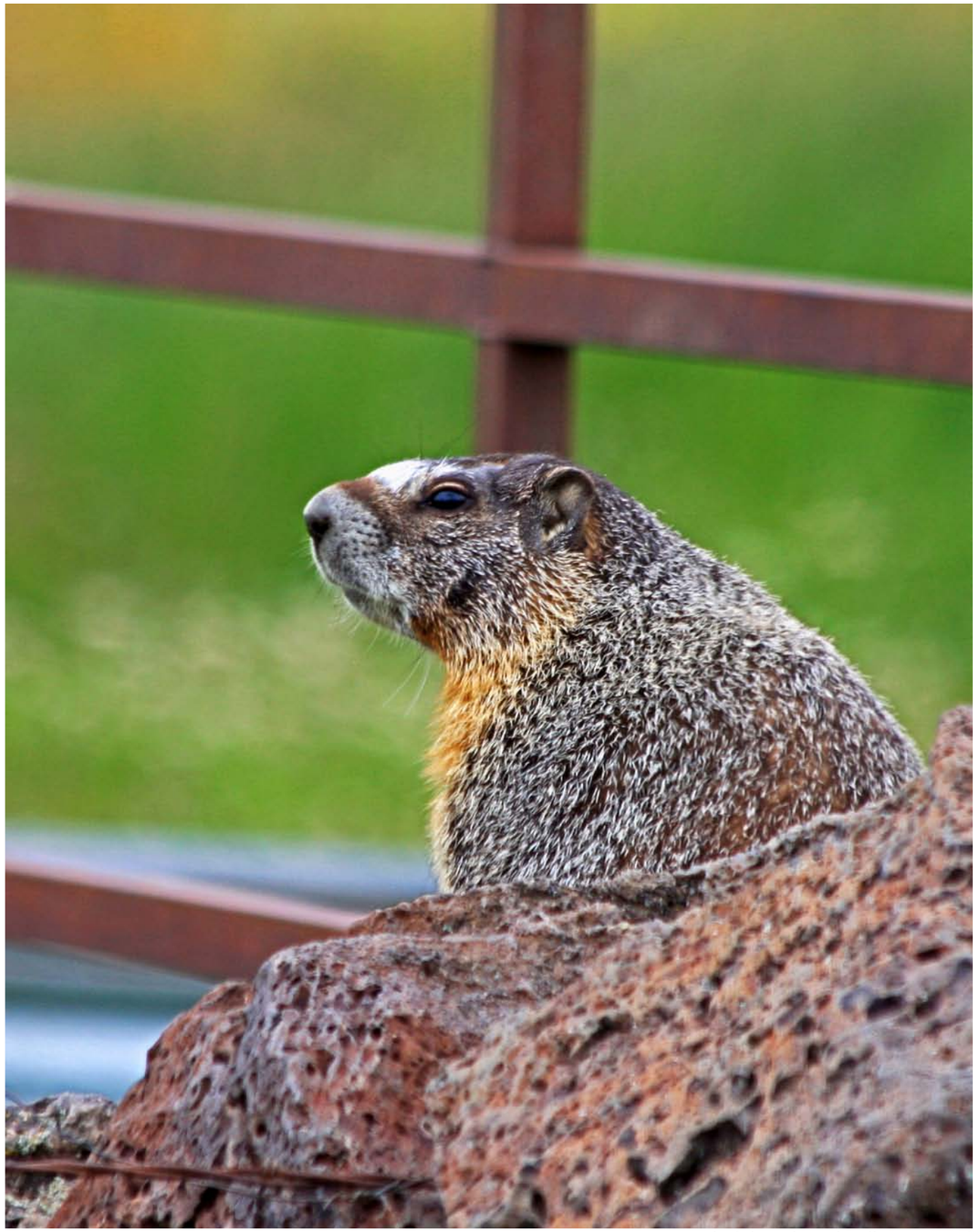
INTEGRATED PEST CONTROL



Marmot in Rocks (Photo by: Ed Williams, CDFA)

INTRODUCTION

The Integrated Pest Control Branch (IPC) is a part of California's pest prevention system with the following overall objective:

Development, implementation and communication of sound public policies on prevention of the damage exotic and harmful plant pests and disease can cause.

The Integrated Pest Control Branch conducts a wide range of pest management and weed eradication projects in cooperation with growers, agricultural commissioners, federal and state agencies, and non-governmental organizations.

BEET CURLY TOP VIRUS CONTROL PROGRAM

Beet curly top virus (BCTV) is an extremely serious plant virus affecting several hundred varieties of ornamental and commercial crops in California. The only known vector of this virus is the sugar beet leafhopper (BLH), *Circulifer tenellus* (Baker).

BCTV is highly destructive to commercially-produced sugar beets, tomatoes, peppers, cucumbers, muskmelons, watermelon, squash, pumpkins, green and dry beans, spinach and varieties of vine seed. Because of the threat to commercial crops, the growers of susceptible crops contribute 100 percent of the funds necessary to control BCTV in California. BCTV also infects backyard gardens upon which many people in California depend to provide fresh table vegetables.

The General Pest Control Strategy Developed by the BCTVCP is to:

- Reduce the potential number of overwintering female BLHs through the application of insecticide on Russian thistle and other weed hosts in the early fall.
- Further reduce surviving gravid overwintering BLH females, prior to egg deposition, once they have concentrated on winter host plants.
- Selectively treat areas of habitat where a spring population of BLHs has developed, preventing migration to crops during late spring and early summer.

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BEET CURLY TOP VIRUS CONTROL

The Beet Curly Top Virus Control Program (BCTVCP) utilizes intensive surveys to locate and monitor BLH populations throughout the year. Once the populations are located, they are evaluated as to the amount of virus in BLH samples, potential for migration of BLHs to susceptible crops in the area, and feasibility of control versus natural mortality due to parasites, predators or weather trends affecting host plants.

Key Highlights in 2009

- Monitored and selectively suppressed overwintering female BLH populations on winter host plants prior to egg deposition.
- Located, monitored and selectively suppressed the spring hatch of BLHs prior to maturation and migration into susceptible crops.
- Assessed the Program's success by surveying susceptible crops for BCTV.
- Mapped all Russian thistle acreage and suppressed high BLH populations prior to dispersal to overwintering areas.
- Continued to support and solicit research relative to BCTVCP objectives.

Using aircraft and ground spray equipment, a total of 43,555 acres were treated with malathion to control BLH populations during 2009. The acreage totals for 2009 were below the 10-year treatment average of approximately 65,000 acres (Table 1).

Table 1. **(Click on image for larger view.)**

Acres Sprayed by Calendar Year 2000-2009

** Did not have treatment permit during 2008*

	SAN JOAQUIN & COASTAL VALLEYS						IMPERIAL /PALO VERDE VALLEYS (Riverside/Imperial Co.)				
Calendar Year	WINTER		SPRING		FALL		All Seasons		YEARLY TOTALS		TOTAL ACRES SPRAYED
	Air	*Ground*	*Air*	*Ground*	*Air*	*Ground*	*Air*	*Ground*	*Air*	*Ground*	
2009	0	0	34,995	400	7,200	0	0	960	42195	1360	43,555
2008*	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	8,130	800	18,610	240	0	0	26,740	1,040	27,780
2006	3,600	0	32,315	160	18,050	480	0	1,840	53,965	2,480	56,445
2005	0	0	6,921	800	16,100	0	0	4,510	23,021	5,310	28,331
2004	6,600	0	29,820	3,270	10,455	0	0	1,240	46,875	4,510	51,385
2003	6,100	0	68,250	2,270	35,500	0	0	1,220	109,850	3,490	113,340
2002	20,825	0	92,300	4,540	39,950	240	0	0	153,075	4,780	157,855
2001	0	0	57,723	3,764	39,750	1,720	0	1,495	97,473	6,979	104,452
2000	0	0	21,375	3,040	42,753	1,330	0	0	64,128	4,370	68,498
Totals	37,125	0	351,829	19,044	228,368	4,010	0	11,265	617,322	34,319	651,641
AVERAGE	3,713	0	35,183	1,904	22,837	401	0	1,127	61,732	3,432	65,164

WINTER SURVEY

Figure 1. Sparse and Stunted Host Plants in Early March

Below normal rains during 2008 left sparse summer host plant development and low beet leafhopper (BLH) populations throughout the San Joaquin Valley (Figure 1). BLH surveys in January 2009 located little vegetation to perform adequate surveys in most areas. Both rangeland host plants and BLH development were found to be inhibited by the lack of rainfall. While rangeland vegetation was stimulated with more rain, the overwintering adult population remained low and scattered across most of the available host plant vegetation.

Imperial/Riverside Counties: January rains had produced host plant germination throughout the desert, but were found to vary with rainfall patterns. Plantago was found to be abundant across the desert. BLH counts were generally low and scattered across the region.

WINTER TREATMENT

BLH populations were not found in sufficient concentrations throughout the winter treatment area. Therefore, treatments were not performed.

SPRING SURVEY

San Joaquin Valley: Survey activities during February and March found overwintering BLH populations to be lower than average. The lack of rain during the fall and below normal rainfall during the rainy season inhibited the development of host plant populations until January in most areas. Host plant germination was delayed until February in several westside areas in Fresno County. When the first generation hatch occurred, high BLH nymph counts could be found.

Imperial County: As spring progressed and desert vegetation dried, BLH counts on roadside host plants increased. It was determined that very large BLH populations were present in some locations. Endangered species maps were developed for listed species within the greater area prior to roadside survey and ground-rig spot treatments.

Salinas Valley: Dry rangeland habitat was found with little in the way of spring host plant development. BLH counts were found to be low, averaging 1:2 per 10 net sweeps.

BEET CURLY TOP VIRUS CONTROL

SPRING TREATMENT

Aerial Treatment: Treatment activities were performed in Kern County on March 27-28 (Figure 2). Approximately 4,905 acres were treated. All areas selected for treatment in Kern County (9,810 acres) were treated at 50 percent, alternating swath application due to Blunt-nosed leopard lizard habitat.

Figure 2

On March 29 through April 1, treatment activities moved to Kings and Fresno counties. Treated acres:

- Kings County - 9,010 acres
- Fresno County - 21,040 acres

Ground Treatment: Ground-rig spot treatments were performed May 12-15 in Imperial County. There were reports of isolated infection in Santa Cruz County this year; however, no aerial or ground-rig spot treatments were deemed necessary in the Salinas Valley.

FALL SURVEY

Program staff surveyed and mapped BLH host plants on the west side of the San Joaquin Valley for potential fall treatment.

The below normal rainfall greatly reduced the development of summer host plants in historic rangeland. There was an increase in sugar beet leafhopper (BLH) host plant development on cultivated fallow ground in western Fresno County (Figure 3). The increase in host plant vegetation in the Westlands Water District was a result of land fallowed due to lack of water.

Figure 3.

Mowing Russian Thistle Westside Fresno County

BLH populations never developed on the sparse, water-stressed Russian thistle. High BLH populations were found developing in Fresno County on much of the fallowed ground, which contrasted with mostly stagnant BLH counts in Kings County and most of Kern County.

TREATMENT NOTIFICATION

Following the mapping of Russian thistle and other summer host plants, standard waivers were sent to property owners to obtain permission to perform survey and treatment, if necessary.

FALL TREATMENT

Treatment activities began on October 5 in Kern County. Three fields totaling 750 acres were treated. Treatments in Fresno County were conducted from October 5-7. A total of 7,200 acres were treated. The BLH populations were reduced between 82 percent and 99 percent.

BEET LEAFHOPPER AND HOST PLANT SAMPLING

Throughout most of the growing season, program staff collected 125 plant and leafhopper samples from rangeland habitat and cropland to determine the presence of BCTV strains. The samples were sent to Dr. Robert Gilbertson at the University of California, Davis for analysis.

Both beet mild curly top virus and beet severe curly top virus strains were found. Seventy-nine samples (63 percent) tested positive for BCTV. Beet mild curly top virus was the most prevalent virus found in tomatoes. Among the 79 positive tests, beet severe curly top virus was found 18 times. Half of the samples testing positive for beet severe curly top virus (nine samples) were also found to contain mixed infections of both strains.

Tomato spotted wilt virus (TSWV) was present and complicated the visual assessment of BCTV symptoms in tomato plants. However, the incidence of TSWV infection in tomato was not as prevalent in 2009 as compared to the 2008 growing season.

BIOLOGICAL CONTROL PROGRAM

Key Highlights for the Biological Control Program for 2009 are:

- Foreign exploration efforts discovered three parasites of the olive fly, two of which are approved for release in California. Over 7,700 adults of *Psytallia concolor* (Namibia) and over 4,000 *Psytallia lounsburyi* were released against the olive fly in California in 2009.
- Continued field studies on the biology and management of the Diaprepes root in southern California. Releases of one egg parasitoid species continued in San Diego County and monitoring for establishment was initiated.
- Obtained funding for host testing of a parasitoid of the Asian citrus psyllid. Collection of plants and non-target insects for testing began.
- Discovered four species of *Trichogramma* parasites attacking eggs of the light brown apple moth in California. Three species are native, and the fourth is new to the United States. Egg parasitism was very low during the spring generation of the light brown apple moth. However, over 75 percent of eggs were parasitized during summer.
- Two primary species and six minor species of parasites of the light brown apple moth were discovered in its native region of Australia by University of California, Berkeley and CDFA scientists. The two primary species are in quarantine at the University of California, Berkeley and undergoing host specificity testing.
- The Lygus bug parasite, *Peristenus relictus*, established at release sites in Santa Cruz and Monterey counties. Field studies show that Lygus bug numbers have dropped 70 percent following release of the parasite. Parasitism in 2009 exceeded 60 percent in some locations and parasites were recovered over 18 miles away, suggesting that the parasite has continued to increase in abundance and spread throughout the strawberry production area.
- The stem weevil, *Mecinus janthinus*, released on Dalmatian toadflax was recovered in good numbers at its release site in Kern County. Field samples showed infestation rates between 41 percent and 58 percent.
- A population of the seed weevil, *Microlarinus lareynii* that attacks puncturevine seedpods or "goatheads" was found well established near Susanville in Lassen County. This is the most northern location found for this weevil to date.
- Populations of the two leaf beetles, *Galarucella pusilla* and *G. calmariensis*, released for control of purple loosestrife were found established at a site near Oroville in Butte County, suggesting that these beetles can tolerate the high summer temperatures of California's Central Valley.

BIOLOGICAL CONTROL PROGRAM

The primary objective of the Biological Control Program is to implement self-sustaining biological controls for serious insect and weed pests in California. The Biological Control Program is divided into two working groups: one for insect pests and one for invasive weeds.

INSECT PESTS

Light Brown Apple Moth (LBAM) - The invasive light brown apple moth, Epiphyas postvittana, was first reported in North America in 2007 with populations concentrated in the central coast of California. Efforts to eradicate this exotic pest are underway. Augmentative releases of native Trichogramma species are under consideration to facilitate control efforts by reducing high moth densities.

In 2009, field studies sampled naturally-occurring parasitism of light brown apple moth eggs in Santa Cruz County and at Golden Gate Park in San Francisco County. Results show that parasitism by local *Trichogramma* was very low during the spring generation of the light brown apple moth but significantly increased in summer and fall. Parasitism in San Francisco County was dominated by *T. fasciatum*, with the rare occurrence of *T. platneri* (Figure 4). In Santa Cruz County, parasitism consisted primarily of *T. platneri* in the spring and early summer, followed by predominantly *T. fasciatum* and secondarily *T. platneri* during fall. The recovery of *T. fasciatum* is the first record for this species in the United States.

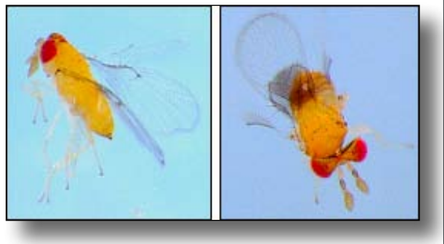


Figure 4.

left: Trichogramma platneri
right: T. fasciatum collected from sentinel eggs

FOREIGN EXPLORATION FOR LIGHT BROWN APPLE MOTH PARASITOIDS

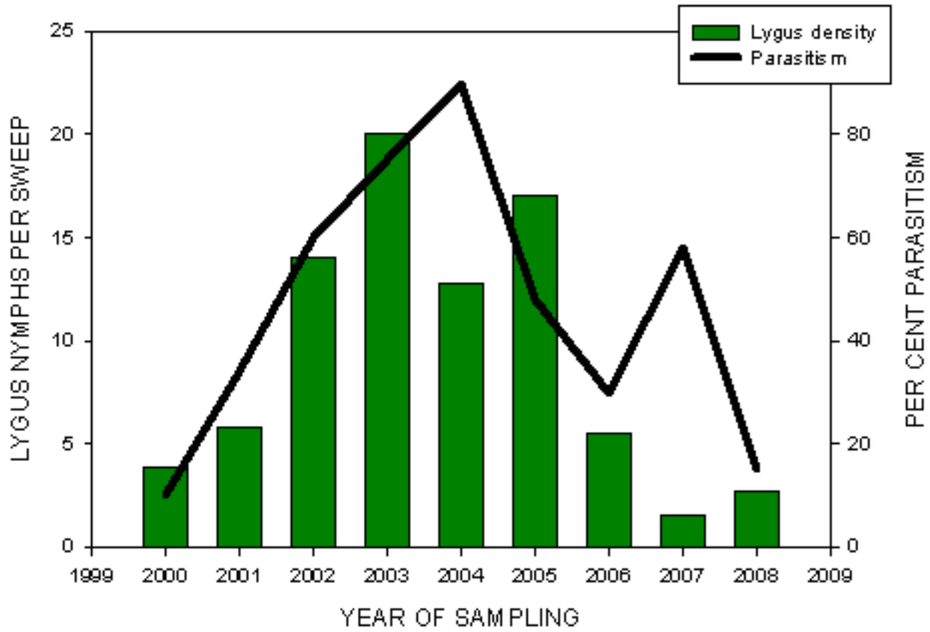
In cooperation with Dr. Nick Mills (University of California, Berkeley), foreign exploration for light brown apple moth parasitoids native to Australia was performed. A series of parasitoid survey efforts in southern Australia in crop and non-crop environments identified two primary species, *Dolichogenidea tasmanica* and *Goniozus jacintae*, and six less common species. Both primary species are now housed in the quarantine facility at the University of California, Berkeley and their host ranges are under evaluation. Host range tests will include four native tortricid species: the orange tortix, the omnivorous leafroller, the oblique banded leafroller and the apple pandemis.

BIOLOGICAL CONTROL PROGRAM

LYGUS BUG

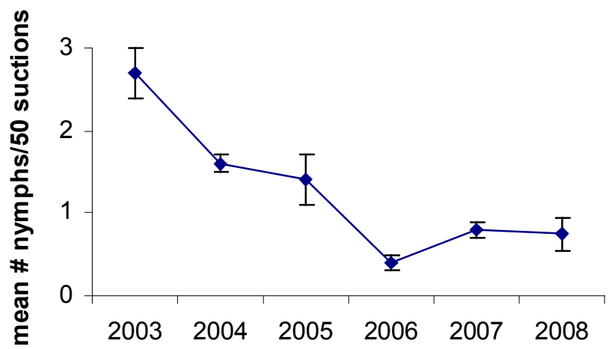
Lygus bug is a serious pest of cotton, strawberries and many other seed crops grown in California. It has developed resistance to traditional insecticides, and the use of newer, more effective products can cause outbreaks of other insect pests. Efforts to introduce two exotic nymphal parasitoids, *Peristenus relictus* and *P. digoneutis*, are underway. Both parasitoid species were produced in cultures at CDFA facilities in Sacramento and released in 1998 (*P. relictus*) and 1999 (*P. digoneutis*) at a research plot near Sacramento. Both were also released at several locations throughout the strawberry production areas along the central California coast from 2002 to 2006. Post-release monitoring at the Sacramento plot showed a substantial reduction in lygus abundance whose peak population densities since 2006 were well below abundance levels observed in 2002-2005 (Figure 5). Lygus abundance in other fields in the Sacramento region showed no declines in abundance.

Figure 5. Nine-year population trend in alfalfa - Sacramento, CA



In Santa Cruz and Monterey counties, only *P. relictus* appears to have established. Efforts in 2009 were directed at monitoring population densities of lygus bug and *P. relictus,* and the spread of the parasitoid from release sites into commercial strawberry production areas. Early results are encouraging. Parasitism at the initial release site in Santa Cruz County exceeded 60 percent in 2009 and the lygus nymphal population remained well below historical levels (Figure 6). Monitoring data from other commercial fields are being collected to determine if this reduction is repeated in other fields ollowing establishment of this parasitoid.

Figure 6. Lygus nymphal densities in organically produced strawberries, Monterey Bay Region, California. The parasite, *Peristenus relictus*, was released in 2002.



WEED PESTS

Dalmation Toadflax: Dalmatian toadflax, *Linaria dalmatica*, is a short-lived perennial from central Europe introduced into the United States around 1874. It is invasive throughout the western United States, including several locations throughout California. The toadflax stem weevil, *Mecinus janthinus*, was released in California in May and June of 2008 in the Hungry Valley State Vehicular Recreation Area (Figure 7). This was the first permitted, intentionally released biological control insect for Dalmation toadflax in California. Releases were made at three sites within the infested area of the park. Three additional nearby sites were selected as 'no-release' comparison sites.

BIOLOGICAL CONTROL PROGRAM

Figure 7. Dalmatian toadflax in bloom at the Hungry Valley State Vehicular Recreation Area where the toadflax stem weevil was released in 2008.

In 2009, all six sites were evaluated for evidence of weevil attack. Results showed that the weevils successfully overwintered at the three release sites, attacking roughly 50 percent of the toadflax stems within three meters of the release locations. The weevils are expected to continue to increase in numbers and spread outward. The 'no-release' control sites were free of any evidence of weevil attack.

Squarrose Knapweed: Several insect biocontrol agents were released against squarrose knapweed in northern California. Insect attack now destroys over 99 percent of the seeds produced each year, effectively preventing production of new (seedling) plants. Current squarrose knapweed infestations are now comprised mainly of older mature plants that continue to age and die. The potential lifespan of squarrose knapweed is not precisely known but our studies show it to be at least eight years, so declines are expected to be slow. Once gone, squarrose knapweed populations will remain low or non-existent due to feeding by seed weevils.

HYDRILLA ERADICATION PROGRAM

HYDRILLA ERADICATION

Highlights for 2009:

- The Program reached a true milestone this year in the Chowchilla River – Eastman Lake Project: we passed seven years with no hydrilla found anywhere in the system (Table 2). With this achievement, the Program will declare the infestation eradicated. Congratulations to the pioneers who undertook this daunting challenge, which began 20 years ago. With hard work and persistence, they overcame all the uncertainties to bring the project to a successful conclusion.

- No hydrilla has been detected in Eastman Lake since 1993. Treatments ceased in the river in 2006. The 2005 and 2006 seasons had high water, enough to germinate any plants in plant-find locations that had been dry, yet no plants emerged.

Table 2. Number of Hydrilla Plants and Tubers Found and Removed from the Chowchilla River, Madera and Mariposa Counties 2000–2009.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Plants	19	5	2	0	0	0	0	0	0	0
Tubers	1,789	23	3	0	0	0	0	0	0	0

- Hydrilla continued to appear in Clear Lake this year, but at a much slower pace than in 2008 (Table 3). The crews found 72 "spots" with hydrilla in 2007 and another 196 spots in 2008, but only 76 spots this year, which was a drop of over 60 percent. In 2008, many of the plants were large, healthy and had reached the surface. This year, no large plants were found, and almost all the finds were small and below the surface. The project added 245 acres that needed treatment in 2007, 325 acres in 2008, and 120 acres this year, for a total of 690 acres needing treatment in 2010. Hydrilla reappeared at Clear Lake after being absent between June 23, 2003 and July 11, 2007. Following the eradication protocol, treatments had ended in the 2006 season. Program biologists anticipated the plant's possible re-appearance and increased the number of boat crews from two in 2006 to three in 2007. The plant's impressive recovery led to increasing the number of crews to four after 2007. The crews this year searched the entire 100+ miles of shoreline 8.8 times during June through November, or once every 2.9 weeks. They also treated nearly every plant within one or two days of finding it.

HYDRILLA ERADICATION PROGRAM

Table 3. Hydrilla and Treatments in Clear Lake, Lake County, 2000 to 2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of hydrilla "finds"	67	41	12	1	0	0	0	72	196	76
Number of management units with finds	31	21	6	1	0	0	0	24	39	24
Fluridone treated acres	1,148	1,335	1,440	1,256	520	137	0	245	573	690
Copper treated acres	117	62	28	5	0	0	0	245	325	120

- Surveyors could find no plants for the fifth year in a row in the infestations at Hesseltine Pond/Bear Creek and Mokelumne Hill (both Calaveras County, found in 1988), and in the infestation in Tulare County (found 1997). They have found no plants for three years in a row in the Redding (Shasta County, found 1994 and 1996) and Nevada County (found 2004 and 2005) infestations.

- The Program lined another 1,500 feet of the most infested section of the irrigation canal in the Yuba County infestation at Oregon House, with the Yuba Agricultural Commissioner's Office and the local Weed Management Area Program, taking the lead on the arrangements. The canal is the headwaters of the infestation. In April 2008, the Program, working with a contractor, had lined about 3,500 feet of the most heavily infested parts of the three-mile infestation.

  Five of the 14 infested ponds in Oregon House had hydrilla in 2009, the same as 2008. In most cases, the infestation was low, although one small pond still produces significant amounts.

  The Program tried several new control options recently. In one pond where there has consistently been hydrilla, the crew stocked sterile triploid grass carp in 2008 and 2009. This is the first time the Program has used carp outside the Imperial Irrigation District. In a pond where there was strong plant regrowth in 2006, staff worked with the United States Department of Agriculture, Agricultural Research Service (USDA-ARS) to test new herbicides: imazamox during 2007-2008 and penoxsulam this year.

- No new infestations of hydrilla were found in California this year, while visiting some 60 lakes, ponds, streams and the Sacramento-San Joaquin River Delta.

- The Program is encountering challenges in the attempt to eradicate a new invader, South American spongeplant. Spongeplant is very similar to water hyacinth, and California would benefit from keeping it out. The first infestation in California was found in 2004 in Shasta County. It responded well to treatment, but in 2006 we discovered large quantities of very small seedlings, indicating that the plant comes back vigorously from seeds. After repeated treatments and hand removal, almost no plants were found in 2009 after a single treatment early in the season. The seed bank appears to last two to three years.

  Unfortunately, since mid 2007, infestations have appeared in at least five other locations, almost all in the San Joaquin Valley. Some infestations are scattered over several miles. The plant population in any one location generally declines dramatically with modest efforts at control, but the multiple finds are straining the Program's ability to keep up.

Background: Hydrilla is a Threat to the Water Resources of the State

Hydrilla is an invasive, submerged, non-native aquatic plant that has been called the world's worst underwater weed. It can: reduce water storage capacity of lakes, ponds and reservoirs; impede water delivery from streams, canals and drains; jam water control structures and choke hydroelectric generators; degrade fish and wildlife habitat; ruin fishing, boating and related tourism (Figure 8); and endanger public health by reducing water flow and producing mosquito breeding habitat. Experience from the infestation in the Imperial Irrigation District indicated that hydrilla can reduce water deliveries from canals as much as 85 percent. Control costs in highly infested states, such as Florida and Texas, are in the tens of millions of dollars per year.

Figure 8. Hydrilla in Clear Lake before treatment began, 1994.

CDFA IS THE LEAD AGENCY FOR THE ERADICATION OF HYDRILLA

Though CDFA is the lead agency, the Hydrilla Eradication Program cooperates closely with local county agricultural commissioners and federal, state, county and city agencies, with Native American tribes and with private individuals and entities. In addition, the Hydrilla Eradication Program received financial and in-kind support in 2009 from the California Department of Boating and Waterways, the California Department of Water Resources, the United States Department of the Interior-Bureau of Reclamation, the United States Army Corps of Engineers-Eastman Lake, the Lake County Department of Agriculture and the Lake County Department of Public Works.

WEED MANAGEMENT AREA PROGRAM

Weed Management Areas (WMA) are dynamic groups of local land managers and public agencies, which have joined together to be more cooperative, strategic and active in battling invasive weeds. WMAs are a unique and crucial infrastructure because:

- They are organized at the local level and can address local issues.
- They foster collaboration between the public and private sector.
- They emphasize education and prevention.
- They bring in matching resources at a ratio of three matching dollars to every state dollar funded.
- They are partners in all statewide weed eradication programs.
- They are partnerships for a better environment.
- They are meant to complement, not supplement, the California Department of Food and Agriculture's (CDFA) core weed management programs.

2009 FISCAL YEAR WEED MANAGEMENT AREA (WMA) STATE FUNDING PROJECT

CDFA received $1.5 million in state general funds for weed eradication projects to be distributed to weed management areas. After consulting with various stakeholder groups and the Weed and Vertebrate Committee of California Agricultural Commissioners and Sealers Association (CACASA), the CDFA WMA Program issued a request for proposals in March 2009.

Ten percent of funds are set aside for CDFA program administration and research. After allocations toward administrative costs and research, the balance is allocated toward baseline funding for each county partner in a WMA. A consensus of the WMA Oversight Committee was reached to provide funds to all 58 counties, as opposed to 45 WMA groups, since many WMA groups have more than one county. Baseline funding was not competitive, but rather an equal distribution to each county partner within a WMA. All WMA base funding work plans can be viewed on the CDFA WMA website.

By legislation, a portion of the funds are allocated for competitive grants. A request for proposals was developed and all WMA groups were eligible to submit proposals for competitive funds. A WMA Advisory Committee ranked the proposals according to achievement of high priority objectives such as permanent eradication and protection of high value assets. The WMA Advisory Committee, as required by the agricultural code, included industry, conservation, scientific and public group representatives. Proposals were required to show a minimum 50:50 match. Seven out of a total of 31 submitted supplemental proposals were selected for funding.

For the past several years, the United States Forest Service (USFS) has funded CDFA to manage a grant program for the prevention, detection and eradication of noxious and invasive weed populations on non-federal public and private lands near forested lands throughout California. The USFS Grant is to prevent the movement of noxious and invasive weeds onto federal forested lands. CDFA has managed the Program via a competitive grant program to weed management areas. Funded projects have included survey and detection for noxious and invasive weed populations, control and eradication activities, and public outreach and education to stop or slow the spread of noxious and invasive weed seed and plant parts.

Many of the USFS lands throughout California are relatively weed-free. However, invasive weeds can move onto USFS lands from adjacent and nearby non-federal public land, private land and tribal land. Pathways of infestation include public and private roads, logging trails, firebreaks, streams, rivers and wind. Weed seed and plant parts can be transported onto forested lands by vehicles (cars, pickup trucks, logging trucks, road maintenance and construction traffic), people (shoes and clothing, hunting, fishing, camping and logging equipment), nearby fire "burned" areas, roadsides and utility rights-of-way, pastures and rangelands, agricultural lands and abandoned wild lands.

Several WMA groups have been funded over the years addressing the following noxious weeds: meadow knapweed, spotted knapweed, purple loosestrife, slender false-brome, leafy spurge, Dalmatian toadflax, rush skeletonweed, perennial pepperweed, musk thistle, Scotch thistle, Iberian starthistle, yellow starthistle, and arundo.

In summary, this partnership between the USFS and the CDFA has proven to be an effective program to slow or prevent the movement of noxious and invasive weeds onto federal forested lands.

NOXIOUS WEEDS PROGRAM

The Noxious Weed Eradication Program's accomplishments in 2009 were:

- 170 distinct A-rated weed infestations were treated and evaluated by program staff.
- Over 11,000 miles of state, county and forest service roads were surveyed for A-rated weeds.
- Program staff gave 27 presentations on noxious weed biology, identification and management techniques. Over 400 public, private and non-governmental attendees participated in these outreach and education events.
- The Program received a federal stimulus American Reinvestment and Recovery Act (ARRA) grant for $7.5 million from the United States Forest Service for the prevention, early detection and eradication of noxious and invasive plants.

The objective of the Noxious Weeds Program is the early detection, containment and eradication of A-rated noxious weeds (Figure 9). A-rated noxious weeds are those of potential great economic or environmental importance, of current limited distribution in the State and for which eradication efforts will likely be successful. Noxious Weed Eradication projects are a cooperative effort between the California Department of Food and Agriculture (CDFA), county agricultural commissioners, United States Department of Agriculture (USDA), United States Forest Service (USFS), and Weed Management Areas (WMAs) across the State.

To date, the Noxious Weeds Program has eradicated 13 weeds from the State. These are whitestem distaff thistle, dudaim melon, giant dodder, serrate spurge, Russian salt tree, blueweed, tanglehead, creeping mesquite, meadow sage, heartleaf nightshade, Austrian peaweed, wild marigold and Syrian beancaper. Weeds approaching eradication at the statewide level include camelthorn, golden thistle, Illyrian thistle, perennial sowthistle, Taurian thistle and smooth groundcherry.

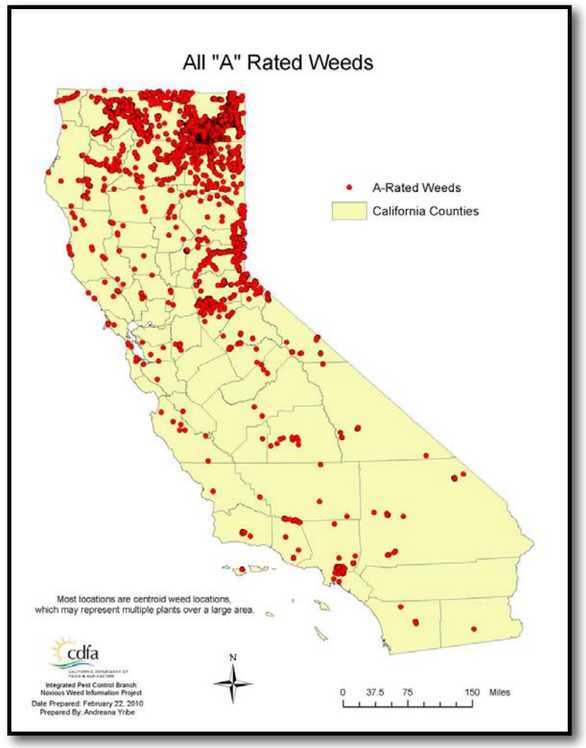
Figure 9. California Conservation Corp, Iberian Star thistle control *(Centaurea iberica)* near Blanchard, CA typical rangeland improvement management of "A" rated weeds.

The California Food and Agricultural Code, Section 403, which states, "The Department shall prevent the introduction and spread of noxious weeds", authorizes the Noxious Weeds Program. The term "noxious weed" is defined in Code Section 5004 as "any species of plant which is, or is liable to be, detrimental or destructive and difficult to control or eradicate."

In addition, the state of California incorporates the federal noxious weeds as state noxious weeds by regulation (CCR, Section 3161).

The statewide distribution of current A-rated noxious weed infestations can be seen on the following map (Figure 10). Note that a disproportionate number of the A-rated noxious weed infestations in California are found in the four most northeastern counties (Lassen, Modoc, Shasta and Siskiyou). This distribution results partially from the large amount of open rangeland in these counties and the related movement of cattle and sheep from out-of-state to these grazing lands. It also results from the movement of weed seeds and viable plant material on vehicles and equipment from other states into these areas.

Figure 10. All "A" Rated Weeds



Click on image to download map.

ARRA / JAPANESE DODDER PROGRAM

AMERICAN RECOVERY AND REINVESTMENT ACT (ARRA)

The Integrated Pest Control Branch (IPC) has had a working relationship with the United States Forest Service (USFS) for the last several years and will continue to receive grants in the near term for invasive plant work. In March 2009, the Branch was notified that the possibility of receiving additional dollars for invasive plant work via the federal stimulus plan was a possibility. In fall 2009, IPC received award letters from the USFS, stating that two grants totaling $7,497,000 were forthcoming with $331,000 designated by the USFS for the distressed counties of Los Angeles and Siskiyou. The balance of the grant will be distributed to CDFA partners for the prevention, early detection and eradication of noxious and invasive plants on non-federal public and private lands near forested lands. The majority of the monies issued from the grant to CDFA sub-recipient partners is for work estimated to begin in January 2010 and ending in December 2011. To date, approximately 41 sub-recipients have either applied or received agreements or contracts for this work.

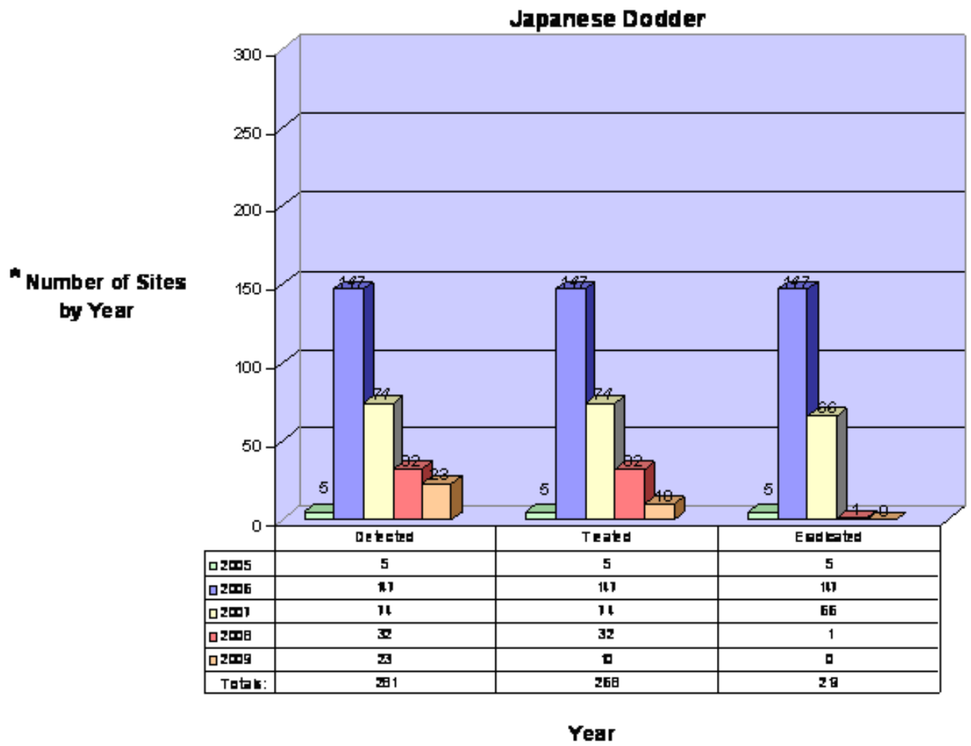
JAPANESE DODDER PROGRAM

In 2009, the Japanese dodder, *Cuscuta japonica* (C. japonica), survey and eradication program goals were to detect and eradicate infestations (Figure 11) of Japanese dodder in California.

As in the previous year, no new infested counties were added and, after reaching a peak in 2006, the number of infestations continues to fall (Table 4). The Program will continue the utilization of available demographic information to locate probable sites of Japanese dodder. Each of the 58 counties in the State is placed into one of three tiers based on the probability of detecting Japanese dodder. The tiers are as follows; Tier I, with high probability (due to a large ethnic population and conducive climate); Tier II, with moderate probability (adjacent to infested counties); and Tier III, with low probability (environment unsuitable for establishment).

The Program is a cooperative effort among the Department, county agricultural commissioners and the USDA. Currently, there are 271 active sites in nine counties, and when detected, all sites are eradicated by removal of infested plant material that is transported to an approved landfill and deep buried. Each treated site is required to be monitored post-treatment to look for any resurgence of the infestation. In 2009, the CDFA Exotic Pest Hotline continued to receive inquiries about Japanese dodder and led to the detection of four sites in two counties.

Table 4. Includes eradicated sites in the counties of Los Angeles, San Joaquin, Shasta, Sutter and Yolo. (**Click on image for larger view.**)



	Detected	Treated	Eradicated
2005	5	5	5
2006	147	147	147
2007	74	74	66
2008	32	32	1
2009	23	10	0
Totals:	281	268	219

Figure 11.

JAPANESE DODDER / PINK BOLLWORM

HISTORY OF JAPANESE DODDER

Japanese dodder is a noxious, annual parasitic plant native to the eastern Asian seaboard and is within a group of dodders frequently referred to as "Giant dodder" (*C. reflexa* and *C. japonica*). First introduced to the United States in Texas in 1941, other infestations were found in Florida in 1943 and in South Carolina on the campus of Clemson University in 1971. Japanese dodder is a leafless parasitic plant that uses specialized temporary root structures called haustoria to obtain water and nutrients from a host plant. Once *C. japonica* seedlings locate a suitable host, they die and the haustoria colonize the host stem and begin to draw water and nutrients from the host.

The Japanese Dodder Eradication Program developed a protocol to provide guidance and establish standards for dealing with infestations.

The six components of the protocol are:

- Detection
- Delimitation
- Eradication
- Post-treatment Monitoring
- Outreach and Education
- Regulatory

The detection component of the protocol (see inset) has several focal points to detect Japanese dodder as follows: the use of citrus greening and tristeza survey personnel to locate incipient infestations; a systematic visual survey of all square mile grids known to contain Japanese dodder; and the use of exotic pest trappers during normal trap servicing. When an infestation is located, 200-meter delimitations and one-mile surveys are conducted to determine boundaries. Treatment, post-treatment monitoring and eradication occur according to timeframes set forth in the protocol. Outreach and education activities in 2009 were limited to the distribution of printed materials, and occasional community meetings were held in the infested areas of the State.

STATE SURVEY

In 2009, state personnel surveyed over 400,000 urban and rural residential properties in the 13 non-contracted counties that are likely, based on demographic information, to have Japanese dodder. This survey resulted in no detections of Japanese dodder.

PINK BOLLWORM ACTIVITIES

The boll weevil, *Anthonomus grandis* Boheman, and the pink bollworm, *Pectinophora gossypiella* Saunders, are probably the two most important cotton pests in the United States. These serious economic pests are the subject of various area-wide control programs by federal, state, local and commercial organizations throughout areas of the United States Cotton Belt. A pink bollworm cooperative eradication program has been started in defined cotton growing regions in Arizona, California, New Mexico, Texas and Mexico.

The CDFA Pink Bollworm (PBW) Program prevents the establishment and spread of this devastating pest and follows the basic guidelines and protocols established under the USDA Area-Wide PBW Eradication Program. The technology used to eradicate pink bollworm has five primary components: 1) extensive survey; 2) transgenic *Bacillus thuringiensis* cotton; 3) pheromone application for mating disruption; 4) sterile PBW moth releases; and, 5) crop cultural control requirements. Program technologies are applied on an area-wide basis within each area.

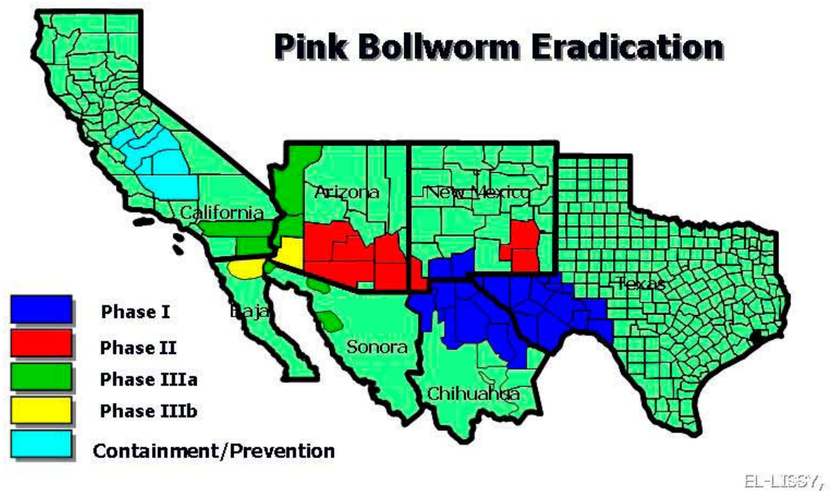


Figure 12. Pink Bollworm Eradication

The program activities of detection and control are coordinated with the USDA and other cooperating state agencies. The CDFA PBW Program uses a risk-based management approach for program detection and control objectives within the San Joaquin Valley (SJV) containment / prevention area (Figure 12).

The USDA pays the costs of sterile production/release activities within California's area-wide PBW Eradication Program. All other program costs of the CDFA PBW Program are industry funded. The assessment fee remains at $2.00 per bale.

PINK BOLLWORM ERADICATION

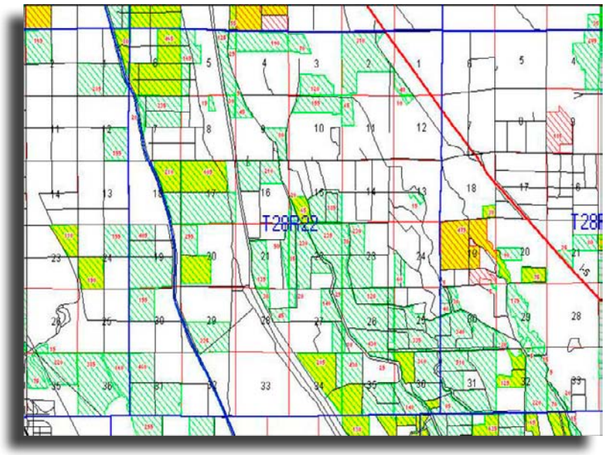
TRAPPING

All cotton-field mapping throughout the State was digitized into computers. These digitally computer generated maps, depicting individual cotton fields, were utilized in trapping, boll survey, sterile release and plowdown monitoring (Figure 13).

A grand total of 190,065 acres of cotton was mapped in California during 2009. Southern California cotton acreage totaled 6,395 acres. Sacramento Valley had a total of 2,390 acres.

PBW Program personnel mapped 181,280 acres of cotton in six counties of the SJV. Pima cotton plantings in SJV for 2009 totaled 118,975 acres (approximately 66 percent).

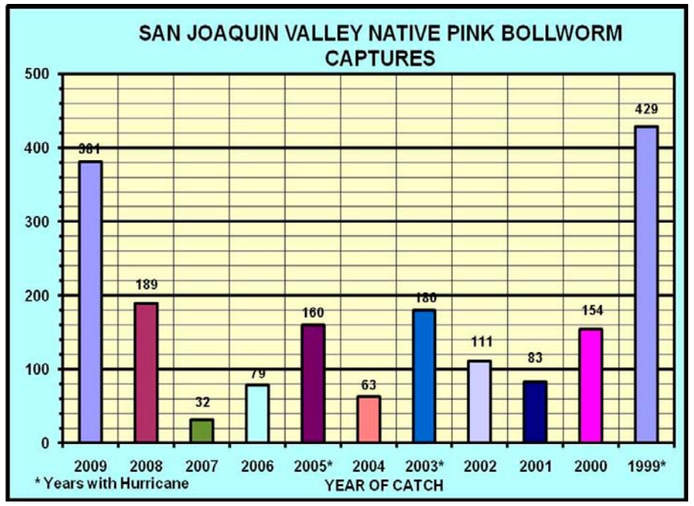
Figure 13. Cotton Map with Pima Varieties in Yellow, Upland in Green



IDENTIFICATION

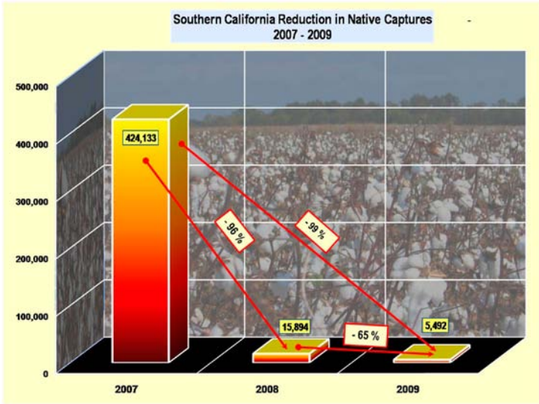
For the San Joaquin Valley (SJV), the lab examined 4,862 traps containing suspect moths submitted by trappers. A total of 73,243 sterile moths and 381 native moths were identified in the SJV traps in 2009 (Figure 14).

Figure 14.



In southern California, pink bollworm (PBW) populations were significantly reduced from the previous year. There was a slight spike in native captures from mid-August into September due to migration from the adjoining area of northern Mexico. Overall, there was a significant decline in natives trapped compared to the pre-area-wide PBW Eradication Program 2007 capture levels due to program control activities (Figure 15). Since 2007 there has been a 98.9 percent drop in PBW moths per trap per week.

Figure 15.



PINK BOLLWORM ERADICATION

STERILE INSECT RELEASE

The average daily release rate for the San Joaquin Valley (SJV) was 1.5 million sterile moths per day when sterile release began on May 6 (Figure 16). The release rate was increased to two million per day on August 7 and remained at two million sterile moths released per day until releases concluded October 3, 2009. Approximately 220,787,334 sterile moths were released in the SJV.

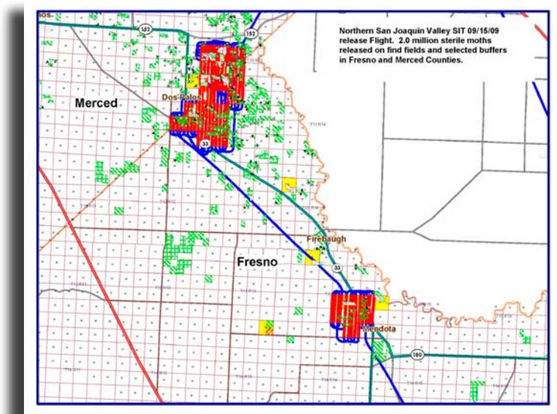


Figure 16

Southern California cotton growing regions were added to the USDA Pink Bollworm (PBW) Area-Wide Eradication Program in 2007. The strategy for this program includes insect monitoring, *Bacillus thuringiensis* (Bt) cotton plantings, sterile insect release and pheromone treatments in non-Bt cotton.

Mass aerial dispersal of sterile PBW moths was performed on cotton plantings in Imperial, Riverside and San Bernardino counties. Approximately 40.8 million sterile moths were released during the cotton-growing season in southern California as a component of the PBW Area-Wide Eradication Program.

PHEROMONE APPLICATIONS

A control method used by the PBW Program is pheromone mating disruption (Figure 17). This technique can induce mating disruption, interfering with reproduction during that period. Three fields totaling 60 acres were treated at the rate of 200 ropes per acre, for a total 12,000 pheromone ropes. No native moths were trapped in these fields in 2009.

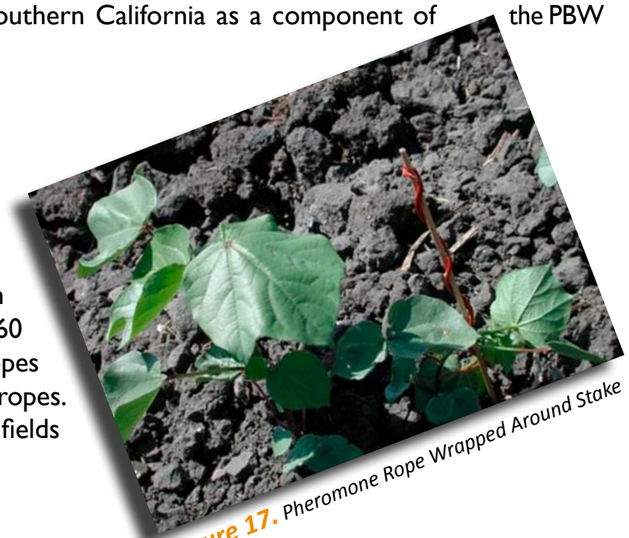


Figure 17. Pheromone Rope Wrapped Around Stake

Bt RESISTANCE MONITORING

Cooperating with the USDA, the Arizona Cotton Research and Protection Council and the University of Arizona, Pink Bollworm (PBW) Program staff conducted trapping and boll survey designed to evaluate PBW resistance to *Bacillus thuringiensis* (Bt) cotton. To date, no resistance has been observed.

COTTON PLOWDOWN REGULATIONS

A reduced tillage permit was issued by CDFA to the PBW regulated districts in the San Joaquin Valley (SJV), and a minimum tillage permit was issued to regulated districts in Imperial and Riverside counties. These permits had several key requirements, including: grower notification to the local county agricultural commissioner; post harvest cotton plant shredding and tillage sufficient to prevent plant regrowth; regulatory inspection of cotton fields; and, for the SJV only, substantial prohibited or restricted areas based on PBW native finds. The most significant change was not requiring that roots, plant stubs, shredding debris and trash remaining from harvesting or clean–up operations be mixed with surface soil.

COTTON BOLL WEEVIL

Since November 19, 1990, no boll weevils, *Anthonomus grandis*, have been trapped in California (Figure 18). The declaration of eradication of boll weevil was issued December 1993. Program efforts continue to maintain boll weevil-free status. Traps are deployed in southern California cotton growing areas to monitor boll weevil activity. No cotton boll weevils were detected.

Figure 18.

Photo by: Alton N. Sparks, Jr., Univ. of Georgia, Bugwood.org

VERTEBRATE PEST CONTROL

THE KEY ACCOMPLISHMENTS FOR 2009 INCLUDE:

- Public Outreach and Education Seminars: Wildlife Damage Management.
- County Bait Manufacturing Quality Assurance/Quality Control Program.
- Vertebrate Pest Control Handbook Development and Publication.
- Specialty Crop Block Grant Award.
- Vertebrate Pest Control Research Advisory Committee (VPCRAC). The primary objectives of the Vertebrate Pest Control Research Program are to maintain the CDFA's field-use rodenticide registrations, provide public education on wildlife damage management and to administer the Vertebrate Pest Control Research Program. The agricultural community and other stakeholders utilize the CDFA's rodenticides in order to prevent and control vertebrate pest damage to agricultural commodities, agricultural infrastructure, water control and conveyance structures, and to protect public health and safety.

The Vertebrate Pest Control Research Program funds research studies to investigate experimental application strategies to improve rodenticide efficacy, non-target hazard studies to reduce the potential hazard of secondary poisoning to non-target species, and produce chemistry and residue data to support the expanded use of rodenticides on crops. Since 1991, the Vertebrate Pest Control Research Program has funded 120 research projects totaling over $8.7 million.

VERTEBRATE PEST CONTROL

PUBLIC OUTREACH AND EDUCATION SEMINARS

Wildlife Damage Management: In 2009, Vertebrate Pest Control Research Program staff provided public outreach and education seminars to the University of California Cooperative Extension Master Gardener Program, the Pesticide Applicators Professional Association, the United States Fish and Wildlife Services, the United States Department of Agriculture, the California Agricultural Commissioners and Sealers Association, and the Department of Pesticide Regulation.

- Eleven education seminars were presented to the public.
- Approximately 1,500 people attended the education seminars.
- Education seminars were presented on Laws and Regulations, Bird Control, Predator Management, Small Mammal Control, Invasive Species Management and current research projects.

COUNTY BAIT MANUFACTURING QUALITY ASSURANCE / QUALITY CONTROL SAMPLING PROJECT

Compliance agreements are in effect between the California Department of Food and Agriculture (CDFA) and eight county agricultural commissioners that formulate rodenticide baits on behalf of CDFA. The compliance agreements specify conditions of manufacture and are part of an overall Quality Assurance/Quality Control Program CDFA has implemented. As part of this program, the Vertebrate Pest Control Research Program staff conducted a comprehensive bait sampling project. Samples of the formulated baits were obtained at each manufacturing county and analyzed at the CDFA chemistry laboratory. The purpose of the sampling project is to ensure that all CDFA–registered rodenticides formulated by the county agricultural commissioners are produced in compliance with the 40 CFR, subpart 158.175, Certified Limits. The sampling project will provide assistance and resources to the formulating county agricultural commissioners to ensure that the formulating county agricultural commissioners can consistently produce material that is in compliance with the United States Environmental Protection Agency certified confidential statement of formula and certified limits.

VERTEBRATE PEST CONTROL HANDBOOK DEVELOPMENT AND PUBLICATION

The *Vertebrate Pest Control Handbook Fourth Edition* (J.P. Clark 1994) has been used as a resource on vertebrate pest control throughout the State and nation, and has been considered the standard for vertebrate pest control information in California. The handbook, as originally written, was the guidebook for the California agricultural commissioners in their efforts to deal with important

VERTEBRATE PEST CONTROL

vertebrate pests in agriculture and public health. Although the handbook has been an important resource in the past, several portions of the handbook were outdated, such as the laws and regulations, vertebrate pest control products, information on diseases related to wildlife and humans, and recent research on wildlife damage management. In 2006, the Vertebrate Pest Control Research Advisory Committee (VPCRAC) funded the development of a revised handbook to provide a relevant, updated resource for California's pest problems. Revisions were made by the CDFA, the University of California, and the California Department of Health Services. The new version is complete and available on the VPCRAC website, www.vpcrac.org. Accurate and up-to-date information is now available to agricultural producers and other interested parties.

SPECIALTY CROP BLOCK GRANT AWARD

Vertebrate Pest Control Research Program staff applied for and was awarded a competitive Specialty Crop Block Grant (SCBG) for the purpose of developing an integrated pest management program for vole control in artichokes. The artichoke industry in California has suffered from severe small mammal damage for several years. Growers are experiencing substantial financial losses due to crop damage attributed to voles, and unfortunately, have a very limited vole management program. For the past twenty years, artichoke growers have used chlorophacinone-treated artichoke bracts to control vole populations. This was an acceptable treatment program until about eight years ago, when artichoke growers began to notice an uncharacteristic increase in vole populations. Studies were conducted to determine if voles were resistant to chlorophacinone, and 50 percent of the Castroville voles tested were determined to be chlorophacinone resistant. The SCBG will allow CDFA, in collaboration with the University of California, Kearney Agricultural Center, to conduct field studies to determine the efficacy of rodenticide treatments, cultural practices and trapping to develop a comprehensive integrated pest management program for vole control in artichokes.

VERTEBRATE PEST CONTROL RESEARCH ADVISORY COMMITTEE

The Vertebrate Pest Control Research Advisory Committee held two meetings in 2009. The first meeting was held on April 22 in Napa County and the second on October 7 in Ventura County.

The following research proposals were recommended for funding by the Committee, approved by the Secretary of CDFA, and initiated in 2009:

- "Amended Scope – Vertebrate Pest Control Certification, Education and Outreach," University of California, Cooperative Extension, San Diego County
- "Reregistration of CDFA Baits for Control of Norway and Roof Rats in Agricultural Fields," University of California, Integrated Pest Management, Kearney Agricultural Center
- "Development and Evaluation of the VPCRAC Website for Vertebrate Pest Research Information," University of California, Cooperative Extension, San Diego County
- "Development of an Integrated Pest Management Program for Vole Control in Artichokes," University of California, Integrated Pest Management, Kearney Agricultural Center
- "Food Safety and Rodent Control in Leafy Green Crops – Amended Per VPCRAC Request," University of California, Cooperative Extension, San Diego County
- "Using Liver Microsomes to Screen Anticoagulant/Inhibitior Formulations for Meadow Vole Control," USDA, APHIS, Wildlife Services, National Wildlife Research Center

Welcome to

LIGHT BROWN APPLE MOTH PROGRAM

Photo Credit: R.Anson Eaglin

Significant Events in 2009

- The sterile moth technique has advanced sufficiently to allow initial operational test releases in Napa County in November 2009. This alternative eliminated the need for aerial spraying of LBAM pheromone over urban areas.
- The LBAM infestation in Carpinteria (Santa Barbara County) was declared eradicated.
- The California Department of Food and Agriculture (CDFA) Interior Quarantine expanded into Los Angeles, Napa, San Joaquin, San Luis Obispo, Sonoma and Yolo counties.
- Twist ties were deployed in isolated LBAM infestations in Los Osos (San Luis Obispo County) and Manteca (San Joaquin County).
- The Program has developed and implemented DNA-based technology to positively identify LBAM eggs, larvae and pupae in California.
- The Program issued a draft Environmental Impact Report (EIR) for public comment, with approximately 300 comments received via oral testimony and written comments. The final EIR will be certified in early 2010.
- The Office of Environmental Health Hazard Assessment (OEHHA) issued a Human Health Risk Assessment of Isomate LBAM Plus (twist ties) in which they projected no human health problems from the use of this technology.
- Canada has imposed a 3-year LBAM-free requirement on LBAM-infested areas before it will allow the free shipment of non-exempt LBAM hosts into that country. The current USDA requirement is three life cycles, or anywhere from 7 to 10 months depending on the area.
- Chile is recommending changes to their regulations that may greatly increase the number of traps that must be deployed and the frequency with which they must be inspected to declare an area LBAM-free. If implemented, these changes will increase the cost of exporting non-exempt LBAM host material to Chile.

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LIGHT BROWN APPLE MOTH

INTRODUCTION

The objective of the Light Brown Apple Moth Program (Program) is to protect California agriculture and the environment through the development, implementation and communication of sound public policies to eradicate the light brown apple moth (LBAM) from the State.

The Light Brown Apple Moth Program is a federal and state cooperative program that coordinates with the county agricultural commissioners, other California state and local agencies, and industry and agricultural organizations throughout the State. The goal of the Program is to minimize the statewide impact of LBAM. The strategy is to contain, suppress and eradicate LBAM, while simultaneously developing other mitigation tools, such as sterile insect release technology and biological control organisms.

BACKGROUND

LBAM is native to Australia, but has successfully invaded New Zealand, New Caledonia, Hawaii and the British Isles. The first recorded detection of LBAM in North America was in Berkeley, California (Alameda County) in February 2007. LBAM is an exotic insect pest of quarantine significance to both CDFA and USDA, whose larvae attack more than 2,000 host plants, including nearly all types of fruit crops, ornamental plantings, vegetables and nursery stock. During severe outbreaks, damage to fruit can be as high as 85 percent of the crop. In addition to direct damage caused by LBAM, California's export markets will suffer due to the implementation of quarantines by foreign and other state governments.[1] Because LBAM is not known to occur in the continental United States, it does not have any natural enemies to keep its population in check. USDA considers it highly likely that LBAM will become permanently established in the United States if eradicative measures are not implemented.

CDFA developed two analyses[2] that predicted the potential increases in pesticide use that LBAM might cause in the urban and agricultural environments. The commercial crops evaluated were apple, pear, avocado, grape, almond, citrus, kiwi, cherry, nectarine, peach, plum, prune, cane berries, strawberry and nursery stock. The amount of increased pesticide depends on the insecticide evaluated. For the microbial insecticide *Bacillus thuringiensis* (Bt), the annual increase ranges from 600-4,800 pounds of additional active ingredient, or a 1.4 percent to 10.5 percent increase in the use of this material compared to that used on the same crops in 2006. For the insecticide spinosad, the annual increase is estimated as 1,900 to 3,800 pounds of additional active ingredient or an increase of 10 percent to 20 percent of the 2006 use. For the insecticide cryocide, the annual increase could be as large as 190,000 to 222,000 pounds of additional active ingredient, or an increase of 31 percent to 36 percent of the 2006 use. It is not anticipated that the growers will use only one insecticide to treat an LBAM infestation. The increases will be spread over a number of materials. The figures above provide a sense of the magnitude of the potential increases in pesticide use that a statewide LBAM infestation could cause in California agriculture.

Insecticide use in the production of nursery stock is estimated to at least double as compared to that used in 2006. For Bt this means an additional 2,100 pounds of active material per year, or for the insecticide chlorpryifos, an additional 5,900 pounds of active material. LBAM has already caused increases in the use of both Bt and chlorpyrifos in the production of nursery stock in the infested areas.

The potential annual increase in homeowner insecticide use that LBAM might cause in the nine currently-infested northern California counties – San Francisco, Marin, Santa Clara, Monterey, Santa Cruz, Alameda, Contra Costa, San Mateo and Solano - ranges from 281 pounds of additional insecticide (represented by permethrin) per year to 2,353 pounds of additional insecticide per year. Extending the analysis to an additional seven coastal counties – Los Angeles, Orange, San Diego, Santa Barbara, San Luis Obispo, Sonoma and Ventura - increases the estimate from 20,364 to 74,305 pounds of additional insecticide per year added to the environment in 16 counties for the foreseeable future. The analysis does not include potential increased pesticide use by owners of business properties, or those maintaining plants in parks, along streets or in natural areas.

The Light Brown Apple Moth Program has formed the following advisory groups:

LBAM Technical Working Group (TWG)

The LBAM TWG is comprised of representatives from the scientific and academic community and individuals with extensive experience regarding LBAM and eradication of invasive species. This group provides recommendations to CDFA and USDA Secretaries regarding feasibility and tools to achieve eradication of the LBAM.

Environmental Advisory Task Force (EATF)

The EATF, chaired by CDFA Secretary A.G. Kawamura, is comprised of representatives from numerous environmental and research-oriented organizations. The EATF informs the Secretary of environmental concerns regarding the Light Brown Apple Moth Program, possible mitigating factors, and research into new control and eradication methods.

1 Robert C. Venette, Erica E. Davis, Michelle DaCosta, Holly Heisler, and Margaret Larson, Mini Risk Assessment, Light Brown Apple Moth, University of Minnesota, Department of Entomology, September 21, 2003. Dowell, R.V., October 13, 2008. A Partial Analysis of the Potential Increase in Pesticide Use Light Brown Apple Moth Might Cause in Commercial Agriculture and Uncultivated Settings in California.

2 CDFA. Unpublished report. Dowell, R.V., April 29, 2008. Calculation of the Potential Increase in Urban Homeowner Pesticide Use Caused by a Generalized Light Brown Apple Moth Infestation in Coastal California.

LIGHT BROWN APPLE MOTH

California Department of Pesticide Regulation (DPR) and Office of Environmental Health Hazards Assessment (OEHHA)

DPR provides consultation to CDFA regarding pesticide registration issues for materials used in the eradication of LBAM. The OEHHA provides consultation to CDFA regarding the potential human health effects of materials used in eradication efforts.

OEHHA has published a report entitled "*Human Health Risk Assessment of Isomate LBAM Plus*," which evaluated the potential human health risks associated with the use of twist ties to dispense LBAM pheromone in mating disruption treatments. The executive summary of the report states, "This document describes a human health risk assessment on the use of Isomate LBAM Plus conducted by the Office of Environmental Health Hazard Assessment (OEHHA), California Environmental Protection Agency. The Isomate LBAM Plus device, also known as a "twist tie," is a pheromone dispenser. It consists of an aluminum wire and a hollow plastic tube that contains moth pheromones and other additives. It is one of the tools employed by the CDFA to control and eradicate LBAM. LBAM is an invasive pest that was first detected in California in early 2007."

In the wild, female moths release a sex pheromone into the air to attract male moths. Male moths detect the pheromone "scent" with a specialized sensory organ and follow it upwind to locate and then mate with the females. The purpose of the pheromone dispenser is to disrupt this communication system and suppress mating and reproduction by preventing male moths from finding females. Pheromones do not kill or harm the moths.

LBAM Strategy Elements

OEHHA evaluated potential health risks associated with exposures to the pheromones and additives in Isomate LBAM Plus. The pheromones belong to a class of chemicals known as Straight Chain Lepidopteran Pheromones (SCLPs). The SCLPs share many chemical structure features. The United States Environmental Protection Agency (USEPA) has determined that SCLPs are sufficiently similar toxicologically to be considered as a group. Toxicology data of one member of the SCLPs can be applied to other members. This approach was also used in this evaluation.

OEHHA's evaluation indicates that inhalation is the most relevant route of exposure, and the use of Isomate LBAM Plus is not likely to pose a health hazard to humans, including children. The reasons are as follow:

- Low toxicity of SCLPs
- Low application rate of the dispenser
- Low release rate of pheromones from the dispenser
- Low expected human exposure to the pheromones

Furthermore, pheromones in Isomate LBAM Plus have chemical structures similar to the common food items and nutrients known as long-chain fatty acids, and they are expected to be metabolized in a similar fashion in the body. These chemicals are not likely to accumulate in the body or persist in the environment.

Pheromones in Isomate LBAM Plus have been shown to be slight skin irritants in rabbits. While no eye irritation tests have been performed on the pheromones, some SCLPs have been shown to be slight eye irritants as well, when the chemicals are placed directly into the eye. Therefore, as a precautionary measure, it is advisable to minimize the chance of eye or skin contact with the pheromones.

Under federal law, the identity and the composition by weight of the additives in a pesticide product such as Isomate LBAM Plus are considered trade secrets. However, scientists from OEHHA had legal access to this information and used it in the assessment. They are prohibited from releasing this information to the public.

OEHHA's evaluation indicates the additives in Isomate LBAM Plus are not likely to pose a health hazard to adults and children. Nevertheless, the additives are potential eye and skin irritants, and as a precautionary measure, it is advisable to minimize the chance of eye or skin contact with the additives.

STATEWIDE DETECTION

CDFA, in cooperation with the USDA and the California county agricultural commissioners (CACs), has an intensive and extensive trapping array throughout the State to determine the extent of the infestation. The Program is designed to locate new LBAM infestations quickly and verify that uninfested areas remain free from LBAM. This trapping effort has revealed LBAM infestations in Alameda, Contra Costa, Los Angeles, Marin, Monterey, Napa, San Benito, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma and Yolo counties (Figure 1). The rest of the State remains LBAM-free.

QUARANTINE AND CONTAINMENT

A federal domestic quarantine order and state interior quarantine restrict the movement of LBAM hosts from the infested portions of regulated counties. Currently, over 3,900 square miles are under quarantine (Figure 1).

The quarantines restrict the movement of hosts in and out of the quarantine areas. Regulated host articles such as nursery stock, assorted fruits and vegetables, cut flowers and greenery,

LIGHT BROWN APPLE MOTH

Christmas trees, hay, and green waste must also comply with the movement restriction(s). The quarantine includes provisions requiring regulated host articles to be inspected and found LBAM-free, originate from a premise that has been trapped and found LBAM-free grown under an integrated pest management system, or moved under specific conditions to a specific location and processed in an approved manner. Infested hosts or premises must be treated or reconditioned and re-inspected and found LBAM-free prior to movement.

Persons or businesses in the quarantine that wish to move regulated host articles in and out of the quarantine area may sign a compliance agreement with their local regulatory official (i.e., the county agricultural commissioner or the Cooperative Light Brown Apple Moth Program) in order to self-certify their hosts for movement. The local regulatory officials conduct periodic inspections and oversight visits of all entities operating under compliance agreements in order to verify compliance.

The current international quarantines will remain in place and other countries may impose their own quarantines on products from the infested portions of California. Canada and Mexico imposed regulations on the movement of agricultural products from the LBAM-infested portions of California in 2007 and these regulations are still in place. Chile did so in 2008. South Korea and China have made inquiries about the Light Brown Apple Moth Program in California. China has regulations in place pertaining to the movement of LBAM host material from Australia and New Zealand. They require that any regulated items be LBAM-free. Growers may treat with pesticide sprays, use cultural practices, inspections, etc., to achieve this requirement.

The Southern Plant Board comprised of state departments of agriculture, petitioned USDA to strengthen the regulations governing the movement of non-exempt LBAM host material from the regulated areas of California. Canada has imposed a 3-year, LBAM-free requirement on the lifting of their quarantine regulations from an area from which LBAM has been eradicated. The current USDA requirement is three life cycles, which is less than a year. Chile is recommending changes to their regulations that may greatly increase the number of traps that must be deployed and the frequency with which they must be inspected to declare an area LBAM-free. If implemented, these changes will increase the cost of exporting non-exempt LBAM host material to Chile.

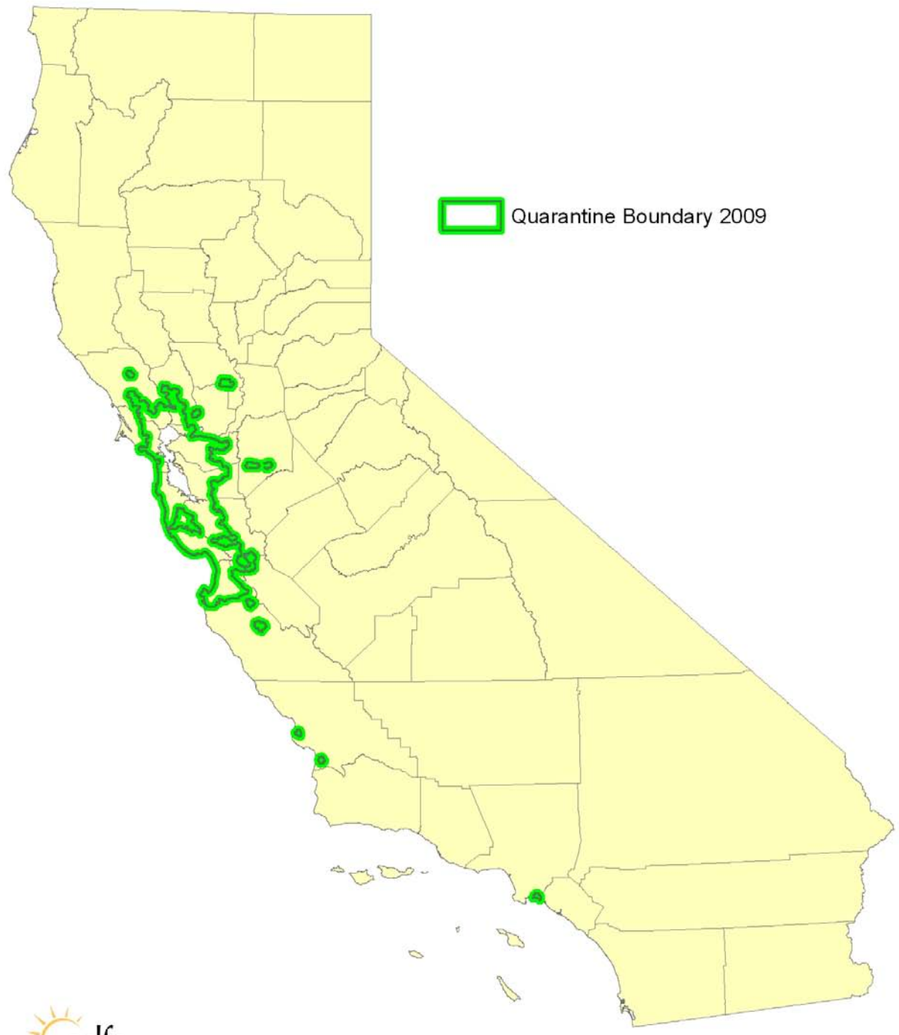

Figure 1

LIGHT BROWN APPLE MOTH

RAPID RESPONSE

The primary objective of the rapid response component is to quickly and efficiently eradicate incipient infestations of LBAM. In 2009, the treatment program used pheromone mating disruption applied by ground. Eradication of LBAM will require a systems approach using multiple tools, including applications of mating disruption pheromone, use of insecticide treatments, releases of sterile moths and other technologies still under development.

To inform the state, county and local officials of the LBAM problem, CDFA presented the Light Brown Apple Moth Program and the eradication plans to each city that received any type of treatment in 2009 and to any city or county that expressed a desire to learn about the Program. Following these meetings, a press release was issued once treatment dates were determined, informing the public of the LBAM problem and the areas scheduled for treatment (Food and Agricultural Code, Section 5771 – 5780).

Prior to the first treatment in any area, residents, local officials and elected officials are invited to an informational open house. This open house provides the residents an opportunity to learn about the treatment that will be occurring in their neighborhood and to ask specific questions. Program, health and environmental specialists are present to answer questions. During 2009, two informational open houses or public meetings were held in the infested areas.

Residents in the treatment area are notified via door-to-door notification, direct mail and the media. The notice contains the date and time of the treatment, the type of pesticide to be applied, any health and safety precautions the citizens may wish to take and a telephone number for residents to call for any additional information. The Department also introduced an e-mail update notification system.

Prior to any treatment, the Department's environmental scientist reviews the California Department of Fish and Game's (DFG) Natural Diversity Database to determine if any threatened and endangered species are present within the proposed treatment boundaries. Depending on the environmental concerns for a treatment area, the Department consults with the Department of Pesticide Regulation (DPR), Department of Health Services (DHS), California and United States Environmental Protection Agencies, DFG, United States Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA) and the Monterey Bay National Marine Sanctuary (MBNMS). Treatment programs are modified if necessary to protect any threatened and endangered species that might be in the area.

TREATMENT RESPONSES

A twist tie formulation of the LBAM pheromone was used in 2009 to treat small outlier infestations. The application of the twist tie treatment is very labor intensive; therefore, this application is reserved for small outlier infestations. As new technologies are developed and approved for use, they will be incorporated into the existing ground treatment plan.

The LBAM infestation discovered in Carpinteria (Santa Barbara County) was eradicated using pheromone disruption treatments delivered by the use of twist ties. Two additional isolated LBAM infestations are currently being treated with twist ties in Manteca (San Joaquin County) and Los Osos (San Luis Obispo County).

ENVIRONMENTAL MONITORING

Prior to the start of any treatments, the CDFA consults with the DPR to determine the need and scope of any environmental monitoring. No additional environmental monitoring was needed for the use of twist ties in 2009.

ENVIRONMENTAL IMPACT REPORT (EIR)

CDFA contracted with a consulting firm to produce an EIR covering the Program activities. A series of public hearings were held to gather public input on the content and scope of the EIR in Monterey, Santa Cruz, San Francisco and Oakland. The EIR was later expanded to cover the entire state of California and to include the use of sterile LBAM. A second series of public meetings about the expanded EIR was held in Los Angeles, San Jose and Sacramento. The draft EIR was available for public comment 2009. The CDFA received some 300 public comments on the draft EIR. As this report goes to press, CDFA is currently reviewing the public comments and preparing responses to them. The final EIR is expected in early 2010.

RESEARCH

Research is an integral part of the Light Brown Apple Moth Program because no single eradication technique currently exists that can be practically, safely and effectively implemented over the entire LBAM-infested area. Therefore, the LBAM TWG recommends eradicating LBAM in a multi-faceted systems approach. As additional treatment methods are developed and approved for use in California, they will be implemented into the project.

Some treatments developed in Australia and New Zealand will have to be modified for California conditions. Others, such as the sterile insect technique, will require various levels of development and validation to make them functional and effective.

LIGHT BROWN APPLE MOTH

The Department has developed a research plan with the following objectives:

- Expand upon and modify alternative methods to eradicate LBAM from California.
- Develop methods to control LBAM if eradication is not feasible.
- Develop data on the possible environmental impacts of any eradication or control method used by the Light Brown Apple Moth Program.
- Develop an effective DNA fingerprint and identification technology for LBAM.

Research and Demonstration Projects in Progress:

- ***Trichogramma Wasps.*** Research by Dr. William Roltsch of CDFA and Dr. Nada Carruthers of USDA Agricultural Research Services has confirmed that commercially available California native Trichogramma platerni and Trichogramma pretiosa will successfully attack and kill LBAM eggs. A colony of T. platerni has been established from which a commercial colony will be developed.
- ***Sterile Male Moth Technique.*** This technique involves mass breeding large quantities of LBAM and releasing the sterilized moths over an infested area. The sterile male LBAM mate with wild female LBAM and no offspring are produced. With each generation, the population declines until it is eradicated. An LBAM colony has been established in Moss Landing, Monterey County. The initial test releases started in November 2009 in Napa County.

Develop methods to control LBAM if eradication is not feasible:

- ***Trichogramma Wasps.*** Trichogramma wasps have been used to control moth pests. It is likely that growers could use these commercial wasps to reduce damage to their crops.
- ***Classical Biological Control.*** Department scientists are working with University of California researchers and with LBAM scientists in Australia and New Zealand to import LBAM parasites to evaluate their ability to attack LBAM and their preference for LBAM compared to native or naturalized leaf roller moth larvae. Several exotic LBAM parasites are currently in colony under quarantine and they have undergone host range testing. A permit to release these two parasites will soon be submitted to the USDA Animal and Plant Health Inspection Service for review.
- ***Evaluate Existing Natural Enemies in California.*** CDFA, USDA and University of California scientists are evaluating the presence and possible impact of existing LBAM natural enemies, especially parasites, in California. To date they have found several larval parasites and at least two egg parasites; one of which is not native to California. These natural enemies are attacking a substantial portion of the LBAM population in the latter part of each year, but, to date, they have not slowed the LBAM population from increasing each year since at least 2007.
- ***Develop an effective DNA fingerprint and identification technology for LBAM.*** The technology to identify all the LBAM life stages has been developed and is in use. It is possible to positively identify LBAM eggs, larvae and pupae using DNA technology.
- ***Develop efficacy data for alternatives to organophosphate pesticide treatments for LBAM-infested nursery stock.*** The Program in cooperation with USDA and Australian researchers are conducting pesticide trials in order to evaluate the efficacy of non-organophosphate pesticides against LBAM. Several materials have proven effective and they are being integrated into the LBAM regulatory program.

Welcome to

PLANT PEST DIAGNOSTICS CENTER

INTRODUCTION

Primary Mission

- The primary mission of the Plant Pest Diagnostics Center is to serve as a scientific and professional resource, providing timely and accurate plant pest diagnostics to our clients, with the aim of protecting California's agriculture and environment.

The Plant Pest Diagnostics Center (PPDC) provides timely and accurate diagnostics of plant pests and diseases in support of the pest prevention programs of the Department. PPDC has five laboratories: Botany, Entomology, Nematology, Plant Pathology and Seed, with about 50 permanent and 30 seasonal employees. The Branch also serves as a scientific resource and provides professional expertise to a number of clients, including the United States Department of Agriculture (USDA), other federal and state agencies, county agricultural commissioners, the University of California Cooperative Extension, the agriculture industry and the public. The PPDC is also a collaborator with the National Plant Diagnostic Network (NPDN), is recognized as the expert lab for the western region, and provides diagnostic service and support to the NPDN. The PPDC scientists, technicians and support staff strive to provide excellence in service and leadership in plant pest diagnostics and biosystematics. More information about PPDC is available at: http://www.cdfa.ca.gov/phpps/PPD/.

The staff of the PPDC continues to provide leadership in plant pest diagnostics and excellence in scientific service and research.

Following is a table representing the number of samples and specimens submitted to the laboratory in 2009, compared with previous years. Most programs include special surveys or projects that generate additional samples that cannot be easily tracked by Pest and Damage Report numbers. Note that sample numbers are not comparable among the different disciplines (labs/programs) as an accurate comparison of workload since the time and work required to diagnose or identify different types of samples varies widely from lab to lab and even sample to sample.

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2009 ACCOMPLISHMENTS

Labs/Programs	2003	2004	2005	2006	2007	2008	2009
Botany[1]	3,284	1,008	1,000	1,474	1,029	1,682	1,167
Entomology[2]	36,146	45,000+	50,000+	50,000+	65,000+	70,000+	80,000+
Nematology[3]	4,782	3,874	4,923	7,912	8,648	5,870	7,864
Plant Pathology [4]	88,233	109,398	103,451	87,434	78,872	90,531	92,218
Seed [5]	3,067	6,923	3,166	5,791	2,427	1,843	3835
Total	**135,512**	**166,203**	**162,540**	**152,611**	**155,976**	**169,926**	**185,084**

[1] An additional 3000 botany specimens were examined & identified for herbarium curation in 2009.

[2] Estimate of specimens examined.

[3] Figure includes quarantine samples, nursery registration & certification samples, USDA Survey Project samples, as well as diagnostic samples.

[4] 2009 figure includes 50,363 samples tested for several target viruses as part of the California Deciduous Fruit Tree, Nut Tree, and Grapevine Improvement Advisory Board (IAB); 26,577 Sudden Oak Death (SOD) samples, 10,000 Asian citrus psyllids tested for Huanglongbing (HLB) causal agent, and 2,169 plant samples tested for HLB causal agent.

[5] Quarantine, phytosanitary and noxious weed seed examinations require identification of 25,000 seeds per sample. Purity analyses require identification of 2,500 seeds per sample. In 2009, the total number of seeds or other propagules actually examined for identification exceeded 18,600,000. Germination tests require the evaluation of 400 seedlings per sample; thus the total number of individual seedlings evaluated for germination tests was in excess of 440,000.

2009 ACCOMPLISHMENTS

Following is a sampling of some of the various accomplishments of the Plant Pest Diagnostics Center from 2009. It is intended to reflect a few of the highlights of the year but is not an exhaustive list.

- The PPDC acquired a USDA permit to receive samples for diagnosis from our Western Plant Diagnostic Network (WPDN) partners in the Pacific—Hawaii, Guam and American Samoa.
- Plant Pathology staff provided special training to a UCD environmental horticulture class in diagnostics, including a lecture by Dr. Cheryl Blomquist on the benefits and limitations of molecular diagnostics.
- In May, the PPDC hosted a group of agricultural extension scientists from Iraq as part of a training program through the College of Agricultural and Environmental Sciences at the University of California, Davis. The Iraqi scientists were then given a tour of the Plant Pest Diagnostics Center and also interacted with our scientific staff on various pest diagnostic topics. Senior Seed Botanist Dr. Riad Baalbaki, who speaks Arabic, was able to explain the complicated concepts of PCR testing as well as phytosanitary seed health testing to the group in their native language. Dr. Dean Kelch, Dr. Andy Cline, Dr. Riad Baalbaki and Mr. Jim Effenberger also evoked much discussion and interest on the part of the group for seed testing and label compliance, weed identification and arthropod pest identification. The group got a real sense of the value and need for such diagnostic tools as seed, botany and arthropod collections in their own country.
- In June, Drs. Suzanne Latham and Cheryl Blomquist detected a rare leaf spot pathogen *Embellisia hyacinthi* on *Scilla* sp. from Monterey County. This is a disease normally found in Europe. This was only the second detection of this pathogen in the United States.
- The first report of downy mildew of Hellebore or Lenten rose caused by *Peronospora pulveracea* in the United States was reported by Drs. Colleen Warfield (UC Cooperative Extension) and Cheryl Blomquist, CDFA Plant Pathologist, in the March 2009 issue of *Plant Disease* (journal).
- In May, scientists presented displays and interacted with school children from all over California at the annual "California State Scientist's Day" at the State Capitol.
- Gladiolus rust was diagnosed from multiple samples collected throughout the San Francisco Bay Area and, for the first time, from a sample collected in Santa Cruz County.
- A species of the needle nematode, *Longidorus* sp., was detected in rhizosphere soils of walnut trees in Glenn County as part of the ongoing USDA Cooperative Agricultural Pest Survey (CAPS) in California. Dr. Sergei Subbotin made the identification of this pest which is subject to mandatory control in Europe.
- The National Karnal Bunt Survey was completed in December by PPDC staff. Fifty-six samples representing 24 counties were tested with no positives detected; in addition, fifty samples from the quarantine area in Riverside County were also tested by Plant Pathology staff and no positives were detected.
- Three posters were presented by PPDC scientists at the National Plant Diagnostic Network (NPDN) national meeting in Miami, FL. The posters featured content on palm wilt disease in California, a summary of the exotic fruit fly detections in the State over the last five years, and the diagnostics class taught by our staff at UCD last fall.
- Branched Broomrape, *Orobanche ramosa*, was identified from a tomato field in San Benito County. This was the first report of branched broomrape in more than twenty five years.
- Plant Pathology staff collaborated with Dr. Francisco Assis of the diagnostic testing company, Agdia, to help with the development of an improved lettuce mosaic virus (LMV) seed health test.
- Plant Pathology and Entomology staff combined efforts to publish the first report of bamboo rust caused by *Kweilingia divina* on *Bambusa domestica* in Los Angeles County.

2009 ACCOMPLISHMENTS

- One intercepted Asian citrus psyllid (ACP) was diagnosed positive by the Plant Pathology staff and confirmed by the USDA for the HLB pathogen. It was found on luggage at the Fresno airport.

- A fungus associated with twig blights and cankers of conifers but unknown in California was indentified from intercepted firewood at a northern border station as *Therrya fuckelii*.

- The botany laboratory received and identified a specimen of squarrose knapweed (*Centaurea squarrosa*) from Shasta-Trinity National Forest. This is only the third report of this A-rated pest from Trinity County and the first report in 15 years. Squarrose knapweed is quite similar to diffuse knapweed (*Centaurea diffusa)*, another A-rated pest, but has slimmer heads and smaller flowers. This similarity may be a reason why it has been so rarely reported from this area.

- Senior Plant Taxonomist Dr. Dean Kelch collected specimens near Lemoore to check for the continued existence of a B-rated pest, Russian knapweed (*Acroptilon repens*), at a historic reported locality. This species was last reported here in the 1970s and no voucher specimen exists. Dr. Kelch confirmed the continued existence of the noxious weed here and collected specimens to permanently document its occurrence.

- A leaf spot disease caused by the fungus *Mycosphaerella handelii* (*Cercospora handelii*) was recently detected on three different native Manzanita species. The fungus was found on *Arctostaphylos pallida* and *A. montarensis* from Contra Costa County and *A. imbricata* from Alameda County. The pathogen, *M. handelii* occurs worldwide as a foliar pathogen of *Rhododendron* spp. Both *Rhododendron* and *Arctostaphylos* are in the same plant family (Ericaceae).

- The tipu psyllid, *Platycorypha nigrivirga* Burckhardt (Hemiptera: Sternorrhyncha Psylloidea), is reported for the first time in North America (USA: California). PPDC scientists Alessandra Rung and Raymond Gill (retd.) published a paper on the insect. Diagnostic characters for identification of adults, nymphs, hosts, damage data and known distribution are given. Originally described in 1987 from Argentina (type-locality), Bolivia, and Uruguay, the tipu psyllid was subsequently recorded in southern Brazil, and Europe. This insect has recently emerged as a serious pest of tipu trees in Curitiba (Brazil), where pest populations are high, trees are being defoliated, and excessive honeydew excretion is fouling concrete sidewalks and vehicles parked under the host trees. Relatively similar levels of damage to tipu trees are observed in West Hollywood, California. In the absence of natural enemies (e.g., predators, parasites or pathogens) or insecticidal controls, the establishment of tipu psyllid in California represents a significant threat to the health and value of tipu tree plantings in California landscapes. The citation for this publication can be found at the end of the report.

- Pachysandra blight caused by *Volutella pachysandricola* = *Pseudonectria pachysandricola* (pest rating=Z) was confirmed in a large garden planting of Japanese spurge (*Pachysandra terminalis)* in Sacramento County. Japanese spurge is an evergreen shrub grown as a groundcover in the shade with attractive dark green leaves and spikes of fragrant white flowers. Although this is the first official confirmation of *Volutella pachysandricola*, this fungus is thought to be present in nearly all pachysandra plantings, but it only becomes a problem when plants are stressed. In the Sacramento Valley, these stressors would include heat, drought and mites. This fungus uses wounds to enter the plant so insect damage can be a way the fungus gains entry. Senior Plant Pathologist Dr. Cheryl Blomquist made the determination.

- The reniform nematode, *Rotylenchulus renifomis*, was recently detected in a shipment of fifty-one *Dracaena deremensis* plants imported from Hakalau, Hawaii. The shipment destined for Costa Mesa was intercepted and inspected by Orange County. The reniform nematode is not present in California and is a quarantine agricultural pest. It can infect a large range of plant hosts. If allowed to enter and establish in California, the reniform nematode can cause significant economic damage mainly to the State's cotton, grape and citrus production.

- Drs. Cheryl Blomquist and Susanne Rooney-Latham in collaboration with Pat Nolan of San Diego County published a "First Report of Downy Mildew on Field-Grown Sweet Basil Caused by a *Peronospora* sp. in San Diego County, California" in the September 2009 issue of the journal *Plant Disease*. The pictures of the disease symptoms were featured on the journal cover. The citation for this publication can be found at the end of the report.

- Staff Botanists curated several dozen plant specimens collected in Louisiana. As California continues to import millions of nursery plants from the southeastern United States, it is crucial to have a good collection of common southeastern plants for diagnosis of received samples. Although many southeastern weeds require too much water to thrive in much of California, several species from this region have become wetland or nursery weeds in California and there is potential for more weed pests to enter and establish here in California.

- Senior Plant Taxonomist Dr. Fred Hrusa continued annotation of Russian thistle (*Salsola* spp.) from other collaborating institutions. Over 200 specimens from Riverside were annotated and over 50 specimens from Rancho Santa Ana Botanic garden were annotated. The species of *Salsola* are important imported weeds in the western United States. Taxonomic confusion has added to the problems in controlling these species.

- In August, the fungal pathogen that causes thousand cankers disease of walnut species (*Juglans*) was confirmed in California by PPDC Pathologists. The disease is associated with widespread dieback of black walnut trees in Colorado and other parts of the western U.S. Branches of southern California black walnut (*Juglans californica*) showing typical canker symptoms of the disease were collected by CDFA officials in Yolo County. The fungal pathogen, *Geosmithia* sp., was readily cultured in the lab from the cankers.

2009 ACCOMPLISHMENTS

- The fungal pathogen *Botryosphaeria corticola* (*Diplodia corticola*) was diagnosed from a residential oak tree in Plumas County— a new record for this fungus in California and the western U.S. The fungus is typically associated with stressed oak trees in Europe but has also been found on a redbud and an oak tree in the eastern U.S. According to the county biologist that collected the California sample, the oak tree appeared to be severely overwatered.

- The spotted winged drosophila, *Drosophila suzukii*, was identified by Associate Insect Biosystematist Dr. Martin Hauser in California— a new record for North America. This insect is part of a group that usually feed on decaying vegetation, but this species attacks healthy fruit and causes significant damage. In California they have been feeding primarily on cherries, but have a wider host range on soft-skinned fruits and have since been found to be widespread in the state as well as in Oregon, Washington and British Columbia.

- Senior Plant Nematologist Dr. John Chitambar was invited to serve as a member of the American Phytopathological Society (APS) Widely Prevalent Phytopathogenic Nematodes Sub-Committee (APS-WPPNL). The Sub-Committee (of APS' Nematology Committee) in response to the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS) is charged with development of a list of about 100 widely prevalent phyto-pathogenic nematodes. USDA's goal, with concurrence from individual state plant regulatory departments, is ultimately to improve and streamline the PPQ 526 permit granting process. The opportunity for CDFA Nematologist to have direct input in this project should prove very valuable to both state and federal agencies.

- The Burrowing Nematode, *Radopholus similis*, was detected in shipments of Pothos, *Epipremnum aureum* plants. Sixty plants in 6-inch pots, originating in Mount Dora, Florida, had been inspected and sampled at their destination at Half Moon Bay, California, by the San Mateo County Commissioner's Office. CDFA Nematologists identified the nematode species. The Burrowing Nematode, an A-rated pest not present within the State, is of quarantine significance to California. Its introduction and spread has been prevented through CDFA's effective External Quarantine program for Burrowing and Reniform Nematodes established in 1953. If left undetected and allowed to establish, the nematode species would be a serious problem to California's citrus, strawberry, carrot and ornamental industries.

- An introduced leaf-footed bug, *Centrocoris variegatus* from the Mediterranean was identified from Yolo County (new county record) on June 10 by Senior Insect Biosystematist Dr. Andrew Cline. The species was only recently identified by PPDC in May 2009, which was then the first report of this true bug in North America. Thus far, the species has been reported from three counties: Alameda - 1st record, Sacramento, and Yolo

RESEARCH / SEMINAR SERIES

- The PPDC tested citrus samples from nursery propagative sources. The sampling and testing was for compliance with citrus tristeza virus (CTV) state quarantine. All samples were tested by Enzyme Linked Immunosorbent assay (ELISA) and positive detections were confirmed by reverse transcriptase polymerase chain reaction (RT-PCR). Four samples out of the 10,168 citrus samples that were tested and were identified as CTV-positive.

- Plant Pathology staff diagnosed a powdery mildew of Mahonia that is new to California. The Mahonia sample was from a nursery in Riverside County. *Microsphaera berberidis* [=*Erisyphe berberidis*] was causing leaf spotting and producing spores directly on the leaf in the irregularly shaped spots. The Mahonia plants came to the Riverside County nursery via a nursery in Jacksonville, Oregon. This discovery is consistent with the first reporting of the pathogen in the U.S. in the state of Washington in 2003 and then in British Columbia in 2005. This powdery mildew is well known in Europe and Asia. Since it has never before been reported in California, it is currently assigned a Q-rating.

- Numerous workshops were held to train County Agriculture Department staff in recognition of various important and high profile insects. These workshops were given throughout the year and included training in the identification of various moths, scales, and flies.

RESEARCH

The scientists at the PPDC continue to research and publish scientific papers as part of the mission of the branch. In the past year, members of the PPDC published 51 scientific papers, books, manuals or other publications. In addition, 38 oral presentations and/or posters were given at various professional meetings, seminars and training workshops. A list of scientific publications and presentations for 2009 are included at the end of this report.

SEMINAR SERIES

The Plant Pest Diagnostics Center seminar series began in 2004 to enable scientists to present research data and discuss ongoing research and pest issues of general importance and has continued throughout 2009 with enthusiasm and participation by many from within and outside of our branch. The speakers have included scientists from the PPDC and other branches of CDFA, USDA, University of California, Davis, and University of California Cooperative Extension. The focus of the seminar series has been to share information on any aspect of basic or applied research or diagnostics and includes invited speakers from other institutions.

CALIFORNIA STATE COLLECTION OF ARTHROPODS

2009 REPORT

The California State Collection of Arthropods (CSCA) is a scientific resource for the local, federal and international community for research and identification of various groups of arthropods, especially insects. The collection is maintained by the Entomology Lab of the Plant Pest Diagnostics Center. Two curators, a collection manager, and the entire scientific staff directly supervise the care, use, growth and development of CSCA by encouraging the use of this collection for research on the taxonomy and systematics of arthropod taxa. The web page for the collection is located at the following website: http://www.cdfa.ca.gov/phpps/ppd/csca.html. As far as specimen usage, the California State Collection of Arthropods issued 24 loans in 2009 representing nearly 3,000 specimens, and hosted more than 20 visitors from the local, national and international communities to study the collections on site. Visitors came from several North American institutions, including the Smithsonian Institution, the Canadian National Collection of Insects, the California Academy of Sciences, the Field Museum, and the Royal Alberta Museum.

The total number of prepared specimens is over 2 million, with approximately 100,000 prepared specimens accessioned in 2009. With the CSCA's blanket permit to collect arthropods in California's State Park system, several seasonal survey efforts were undertaken in 2009, including Indian Grinding Rock Historical, Calaveras Big Trees and Prairie Creek State Parks, as well as Redwoods National Park. In addition, the CSCA organized the 2009 North American Dipterists Society field meeting, based in Crescent City. CSCA's frozen tissue collection continues to grow. At least 12 holotypes and numerous paratypes were deposited in CSCA in 2009, and the collection has been recognized as an important repository for certain groups of arthropods. While personal examination of types may always be necessary, there are plans to add multiple-view close-up digital images to the CSCA Web page for each species held. The inventory of the entire collection is nearly complete with more than 40,000 species so far.

To accommodate interested vocational and avocational entomologists locally, regionally, and worldwide the CSCA has a Research Associate program. Through the associate program, PPDC encourages the use of the collection, the growth of the collection through their respective donations and allows associates to cite their status, if necessary, to provide an institutional address for publications or grants. Several additional scientists have applied to our program in 2009 and have been awarded this courtesy appointment. The Research Associates can be found on the branch website at: http://www.cdfa.ca.gov/phpps/ppd/csca.html#associates.

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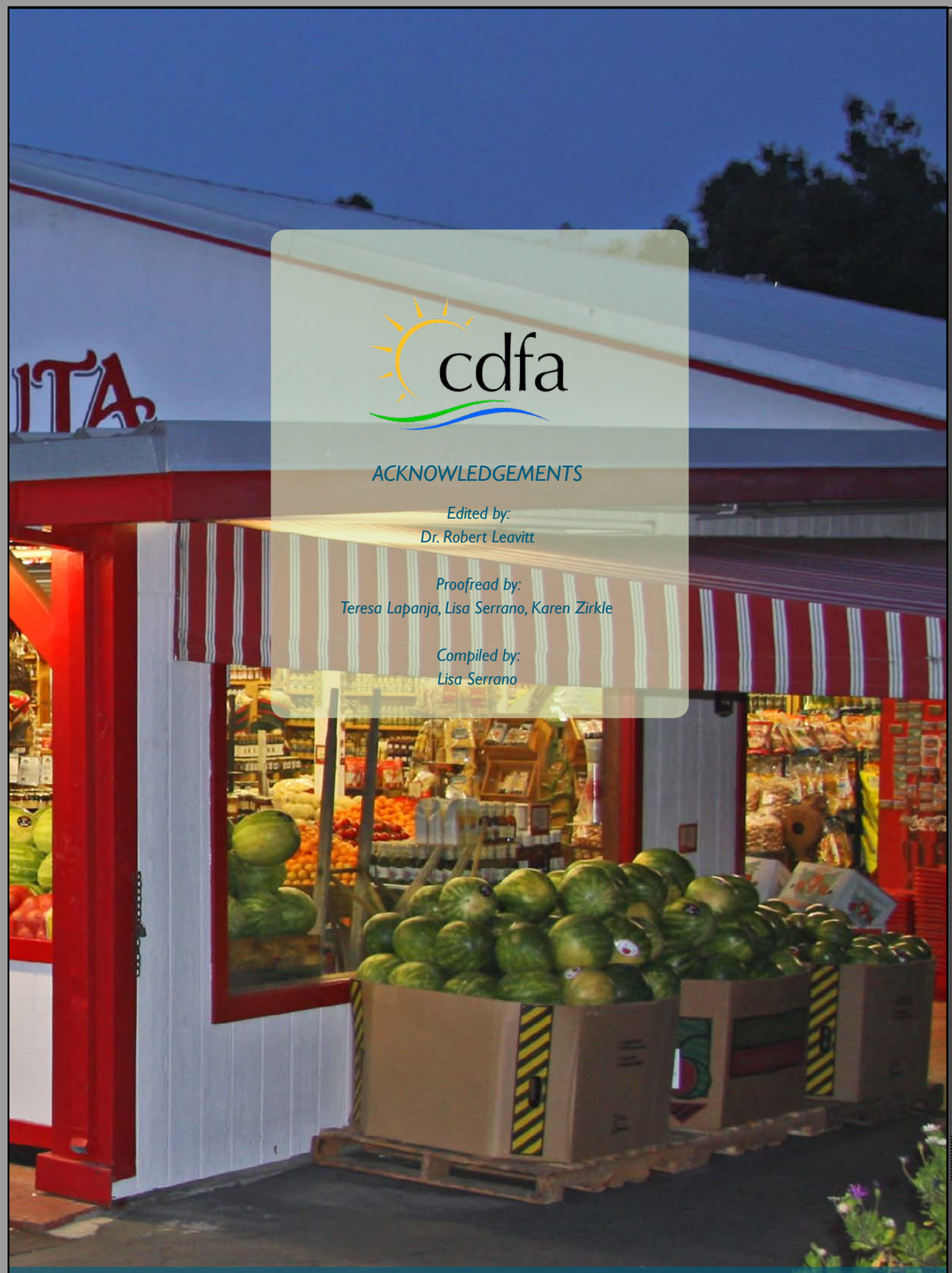
ACRONYMS

ACP	Asian citrus psyllid
ACIT	Agricultural Commodities Investigative Team
APS	American Phytopathological Society
APS-WPPNL	American Phytopathological Society Widely Prevalent Phytopathogenic Nematodes Sub-Committee
ARA	Artichoke Research Association
ARRA	American Reinvestment and Recovery Act
AGM	Asian gypsy moth
BCTV	beet curly top virus
BCTVCP	Beet Curly Top Virus Control Program
BOE	Board of Equalization
BLH	sugar beet leafhopper
BLM	Bureau of Land Management
BPS	Border Protection Stations
CAC	County Agricultural Commissioner
CBP	U.S. Customs and Border Protection
CDFA	California Department of Food and Agriculture
CEQA	California Environmental Quality Act
CHRPEP	County High Risk Pest Exclusion Program
CLB	cereal leaf beetle
CMS	Call Management System
CSCA	California State Collection of Arthropods
CTV	citrus tristeza virus
CWR	chrysanthemum white rust
DFG	California Department of Fish and Game
DHS	California Department of Health Services
DPH	California Department of Public Health
DPR	California Department of Pesticide Regulation
DRW	Diaprepes root weevil
EATF	Environmental Advisory Task Force
ECB	European corn borer
EGVM	European grapevine moth
ELISA	enzyme-linked immunosorbent assay
FCM	false codling moth
FPS	University of California, Foundation Plant Services
GFLV	grapevine fan leaf virus
GFF	guava fruit fly
GLRaV	grapevine leafroll associated viruses
GM	gypsy moth
GWSS	glassy-winged sharpshooter
HFFRF	Hawaii Fruit Fly Rearing Facility
IAB	Fruit Tree, Nut Tree and Grapevine Improvement Advisory Board
IPC	Integrated Pest Control Branch
JB	Japanese beetle
JFTB	Joint Forces Training Base
KB	Khapra beetle
LAX	Los Angeles International Airport
LBAM	light brown apple moth
LBAM TWG	Light Brown Apple Moth Technical Working Group
MBNMS	Monterey Bay National Marine Sanctuary
MDFF	Mediterranean fruit fly
MXFF	Mexican fruit fly
NAPPO	North American Plant Protection Organization
NOAA	National Oceanic and Atmospheric Administration
NOR	Notice of Rejection
NPDN	National Plant Diagnostic Network
OEHHA	Office of Environmental Health Hazards Assessment
OFF	oriental fruit fly
OIP	Origin Inspection Program
PCN	potato cyst nematode
PD/EP	Pest Detection/Emergency Projects Branch
PDV	prune dwarf virus
PDR	Pest Detection Record
PE	Pest Exclusion Branch
PPDC	Plant Pest Diagnostics Center
PRM	panicle rice mite
PRP	Preventive Release Program (Mediterranean Fruit Fly)
PRT	Pest Response Team
PUP	Pesticide Use Permit
PVPA	Plant Variety Protection Act
R & C	Registration and certification
RIFA	red imported fire ant
RT-PCR	reverse transcriptase polymerase chain reaction
SCBG	Specialty Crop Block Grant
SHIRO	Shirofugen (Japanese cherry tree, scientific name: *Prunus serrulata*)
SIT	Sterile Insect Technique
SITC	Smuggling Interdiction and Trade Compliance
SJV	San Joaquin Valley
SOD	Sudden Oak Death
SSU	Strategic Services Unit
State	state of California
SWD	spotted wing drosophila
TSWV	tomato spotted wilt virus
TYLCV	tomato yellow leaf curl virus
UC	University of California
UCD	University of California, Davis
UPS	United Parcel Service
USDA	United States Department of Agriculture
USDA/APHIS	United States Department of Agriculture-Animal and Plant Health Inspection Service
USDA/ARS	United States Department of Agriculture-Agricultural Research Service
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VMB	vine mealybug
VPCRAC	Vertebrate Pest Control Research Advisory Committee
WMA	Weed Management Area
WPDN	Western Plant Diagnostic Network
WSFF	white striped fruit fly



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