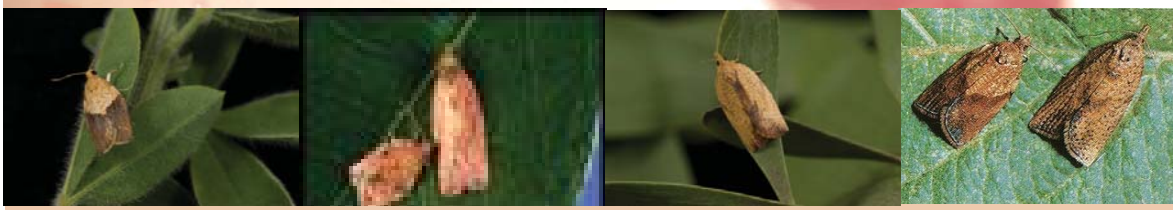
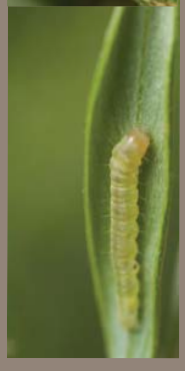
2008 Report To The Legislature: The Light Brown Apple Moth Program





-2008-

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

PLANT HEALTH AND PEST PREVENTION SERVICES

-2008-

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2008 Significant Events

- Analysis of health complaints from aerial pheromone applications by the Office of Environmental Health Hazard Assessment, Department of Pesticide Regulation and Department of Public Health, with a finding of no correlation to the aerial pheromone applications.
- CDFA announced that the sterile moth technique had advanced sufficiently, and that it would be able to produce sterile moths to conduct an insect release program in 2009. This new alternative would eliminate the need for aerial spraying over urban areas.
- CDFA Interior Quarantine expanded into Napa, Santa Barbara and Sonoma counties.

In 2008, the California Department of Food and Agriculture (Department) and the United States Department of Agriculture (USDA) continued trapping, eradication and control of light brown apple moth (LBAM). Ground treatment measures were aimed at isolated outlier infestations with the use of twist tie ropes infused with a mating disruption pheromone in Alameda, Contra Costa, Marin, San Mateo, Santa Barbara, Santa Clara and Solano counties. No aerial applications were applied in 2008. At the same time, developments of the sterile moth technique had advanced sufficiently; therefore, this new alternative would eliminate the need for aerial spraying of pheromone over urban areas.

The implementation of an extensive trapping array throughout California revealed LBAM infesting residential areas, nurseries, croplands and forests in Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano and Sonoma counties (Attachment 1, Page 17). The first recorded detection of the LBAM in North America occurred in February 2007 in Berkeley (Alameda County).

Prior to the first treatment in any area, residents, local officials and elected officials are invited to an informational open house. This meeting provides the residents an opportunity to learn about the treatment that will be occurring in their neighborhood and ask specific questions. Program, health and environmental specialists are present to answer questions. During 2008, 102 informational open houses or public meetings were held in the treatment areas.

ENVIRONMENTAL IMPACTS

The LBAM is native to Australia, but has successfully invaded New Zealand, New Caledonia, Hawaii and the British Isles. The LBAM is an exotic insect pest of quarantine significance to both CDFA and USDA whose larvae attack more than 2,000 host plants (USDA Environmental Assessment Treatment Program for LBAM, February 2008) including nearly all types of fruit crops, ornamental plantings, vegetables and nursery stock. The pest stunts and deforms young seedlings; spoils the appearance of ornamental and native plants; and injures deciduous fruit-tree crops, citrus and grapes. During severe outbreaks, damage to fruit can be as high as 75 percent of the crop[1].

LBAM is not known to occur in the continental United States; therefore, it does not have any natural enemies to control its population. It is considered highly likely by the USDA that LBAM will become permanently established in the United States if eradicative measures are not implemented. California's climate will support a continuous breeding population that will lead to its permanent establishment in the state.

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.

EXECUTIVE SUMMARY

TRADE IMPACTS

California's export markets will suffer due to the implementation of quarantines by foreign and state governments.

- The current infestation has already caused Canada , Chile and Mexico to enact restrictions on crops and plants grown California counties infested with LBAM.
- Initially, Canada quarantined all of California and Mexico, and refused shipments of all host crops from California.

METHODS OF ARTIFICIAL SPREAD

The most significant route of artificial spread is likely to be on plants sold through nurseries and destined for commercial, ornamental and garden plantings. Other methods of spread are on green waste, unintentional movement of fruits and vegetables out of quarantine areas.

EXPANDED HEALTH MONITORING

The Office of Environmental Health Hazard Assessment (OEHHA), working with the Department of Public Health and the Department of Pesticide Regulation, expanded health monitoring through:

- Establishment of a phone bank to be staffed by trained professionals who can answer health related questions about the formulations and take reports on citizen health complaints.
- Development of procedures to collect and analyze data on citizen illness reports in the treatment areas.
- Educating health care professionals about the program and any potential health effects of the formulations.

TREATMENT METHODS

To develop an eradication strategy, the USDA assembled an LBAM Technical Working Group (TWG) of subject matter experts from the United States, Australia and New Zealand. Their charge is to provide recommendations on survey methods, mitigation tools and eradication strategies. The LBAM TWG provides recommendations for the development of a multi-faceted eradication program involving detection protocols, regulatory actions, treatment strategies and research priorities.

All treatment product formulations are reviewed and approved for use by the Environmental Protection Agency (EPA), California Department of Pesticide Regulation (CDPR) and the California Office of Health Hazard Assessment (OEHHA). Prior to treating any area, residents and elected officials are notified and invited to public meetings that are held before treatment; and 1st class letters are sent to each residence.

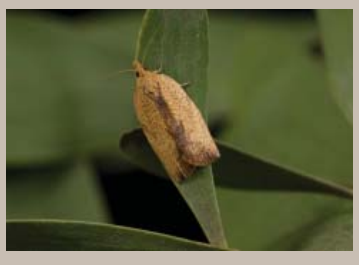
LEGISLATION

In 2008, the Governor signed legislation that increases the notification requirements for aerial applications in urban areas and establishes a process for the development of a pest risk assessments, including consulting with related agencies to do environmental, health and pesticide analysis for the development of a plan for eradicating or managing potential invasive pests.

In an effort to control and eradicate the pest from California the Department will continue to evaluate the spread and infestation of the pest. The Department, with USDA, will continue the development and research of new technologies that reduce the impacts to the general public and the environment.

LBAM PROGRAM

The Department is charged with control and eradication of invasive pests and diseases. Our pest prevention program is uniquely positioned to protect California's urban and natural environments as well as its agriculture. To minimize the statewide impact of LBAM, CDFA's strategy is to contain, suppress and eradicate LBAM while simultaneously developing other mitigation tools that can act as part of a program, such as, male moth attractant treatments, sterile insect release technology and biological control organisms.



Organization

The LBAM project 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 program is administered by the Director of the Division of Plant Health and Pest Prevention Services in accordance with the policies and priorities set forth by law and the Secretary of the Department. Program employees located at satellite facilities in Watsonville, San Jose, Carpinteria, and Albany are responsible for coordinating and implementing the program operations. They also work in conjunction with the county agricultural commissioners to ensure the program activities are conducted in accordance with all statutory and regulatory requirements. An Insect Biosystematist at the Department's Plant Pest Diagnostics Center identifies all of the LBAM detected.

The LBAM program has formed the following advisory groups:

LBAM Technical Working Group (LBAM TWG)

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

Environmental Advisory Task Force

The Environmental Advisory Task Force, chaired by Secretary Kawamura, is comprised of representatives from numerous environmental and research-oriented organizations. The task force informs the Secretary of environmental concerns in regards to the LBAM eradication program, possible mitigating factors and research into new control and eradication methods.

California Department of Pesticide Regulation (CDPR)/ Office of Environmental Health Hazards Assessment (OEHHA)

The CDPR provides consultation to CDFA regarding pesticide registration issues for materials used in the eradication of the LBAM. The OEHHA provides consultation to CDFA regarding the potential human health effects of materials used in eradication efforts. The CDPR and OEHHA developed a joint document that analyzed the available health and safety data of the pheromone products associated with the LBAM eradication program. Their summary states: "The toxicity data on the pheromone active ingredients, as well as on microencapsulated pheromone product formulations, suggest that exposure to a high dose of airborne Checkmate microcapsule particles could cause eye, skin, or respiratory irritation. The application rates were extremely low, and it is likely that exposure occurred at levels below those that would be expected to result in health effects." Subsequently, OEHHA, CDPR and Department of Public Health reviewed the citizen health complaints from the areas treated with the LBAM pheromone from the air. Their summary states: "This report is a collaboration between the Office of Environmental Health Hazard Assessment (OEHHA), Department of Pesticide Regulation (DPR) and Department of Public Health (CDPH). It summarizes the symptom reports received during and after aerial pheromone applications to control the light brown apple moth (LBAM) on the Monterey Peninsula on September 9, 10, and 11 and October 24, 25, and 26, 2007, the north Santa Cruz area of Santa Cruz County on November 8 and 9, 2007, and the North Salinas/Boronda and Prunedale/Royal Oaks areas of Monterey County on November 9 and 11, 2007 (CDFA 2007). The report provides an overview of the symptom reports consolidated from various sources that came to our attention prior to April 1, 2008. Our most significant conclusion is that we were unable to link the reported symptoms with exposure to the pheromone formulation."

LBAM PROGRAM CONT.

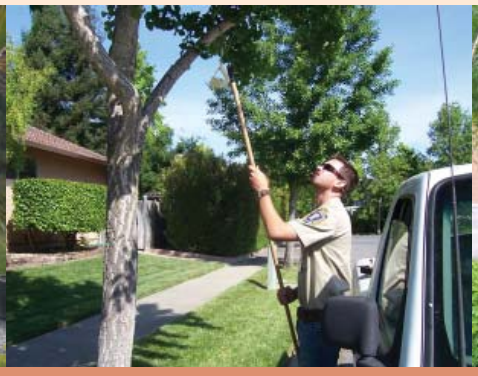
LBAM STRATEGY ELEMENTS

1. Statewide Detection
Place LBAM traps throughout the state to detect new infestations of LBAM while at low population levels. Early detection will increase the probability of eradicating small incipient populations.

2. Quarantine and Containment
Prevent the spread of LBAM to new areas of the state by regulating shipments of host plants and material.

3. Rapid Response
Respond quickly to detections of LBAM in new areas by intensively trapping the area and applying eradicative treatments. Apply eradicative treatments to the small outlier infestations, the areas with the heaviest LBAM detections and in the southernmost areas where LBAM has been detected.

4. Research
Identify potential sources of the infestations; develop treatment alternatives, biological control organisms and the sterile moth technique.




STATEWIDE DETECTION

Following the first detection of the LBAM in Berkeley, the Department in cooperation with the United States Department of Agriculture (USDA) and the California Agricultural Commissioners (CAC) immediately launched 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.

To comply with the Federal Domestic Quarantine Order, DA-2007-42, the LBAM Project continues to monitor over 53,000 LBAM traps throughout the state. These traps are strategically and systematically placed targeting commercial, residential, nurseries, croplands and forested areas of the state. Because LBAM had never been detected in California, at the recommendation of the LBAM TWG, traps were placed within the infested counties to determine the seasonal occurance of LBAM in California. Finds that are three miles from any other detection site are intensively trapped (delimitation trapping) to determine if an infestation is present. Within 72 hours of the detection, 300 additional traps are placed in a nine square mile area to monitor the LBAM activity in the area.

This trapping effort has revealed LBAM infestations in Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano and Sonoma counties (Attachment 1, Page 17). A total of 60,569 LBAM were trapped in the infested counties. The rest of the state remains LBAM-free.

QUARANTINE AND CONTAINMENT

A federal domestic quarantine order and parallel state interior quarantine restrict the movement of LBAM hosts from portions of the following counties: Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma counties. Currently, over 1,900 square miles are under quarantine (Attachment 1, Page 17).

The quarantines restrict the movement of hosts within and out of the quarantine areas. Regulated host articles such as nursery stock, assorted fruits and vegetables, cut flowers and greenery, Christmas trees, hay and green waste must comply with the movement restriction prior to moving within and out of the quarantine areas. The quarantine includes provisions requiring regulated host articles to be inspected and found free of LBAM; originate from a premise that has been trapped and found free of LBAM; 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 reinspected and found free of LBAM prior to movement.

Persons or businesses in the quarantine that wish to move regulated host articles within 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 LBAM Project) 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.

LBAM Regulatory Procedures Manual

The LBAM Regulatory Procedures Manual is currently under review by program staff to propose modifications of the State Interior Quarantine that are warranted due to the use of IPM programs, changing conditions, and other facts now becoming available. A quarantine should promptly be modified, either by inclusions of restrictions necessary to its success or by removal of requirements found not to be necessary. The obligation to modify a quarantine as conditions develop is a continuing obligation and should have continuing attention.

RAPID RESPONSE

The primary objective of the rapid response component is to quickly and efficiently eradicate incipient infestations of the LBAM. The trapping data revealed small isolated infestations that were treated using ground treatment techniques. To eradicate these infestations, joint emergency responses by the USDA, the CDFA and county agricultural commissioners began in June 2007.

The treatment program uses chemicals and mating disruption applied by ground depending on the size and location of the infestation. Eradication of LBAM will require a systems approach using multiple tools, including applications of a mating disruption pheromone, use of insecticide treatments, releases of sterile moths and other technologies still under development.

RAPID RESPONSE CONT.

Using the tools available in 2008, the eradication strategy had the following components:

- Treating the small outlier infestations.
- Communication with elected officials, stakeholders and informational open house meetings.

To inform the state, county and local officials of the LBAM problem, the CDFA presented the LBAM program and the eradication plans for each city that received any type of treatment against the LBAM. 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, specifies the actions that must occur in notifying residents and physicians in the area that is scheduled to be treated. Prior to the first treatment in any area, residents, local officials and elected officials are invited to an informational open house. This meeting provides the residents an opportunity to learn about the treatment that will be occurring in their neighborhood and ask specific questions. Program, health and environmental specialists are present to answer questions. During 2008, 102 informational open houses or public meetings were held in the treatment areas.

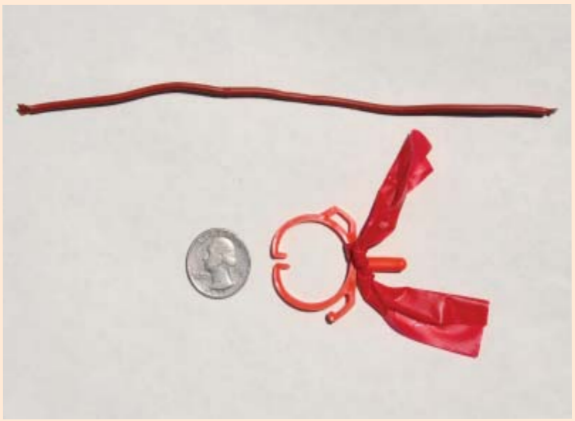
Residents in the treatment area are notified via door-to-door notification, direct mail and the media. The notice contains the date and time of the treatment, the type of pesticide to be applied, any health and safety precautions the citizens may wish to take and a telephone number for residents to call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

Prior to any treatment, CDFA's Environmental Scientist reviews the California Department of Fish and Game's 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, Department of Health Services, California and United States Environmental Protection Agencies, the Department of Fish and Game and the United States Fish and Wildlife Service, National Oceanic and Atmospheric Administration and the Monterey Bay National Marine Sanctuary. Treatment programs are modified if necessary to protect any threatened and endangered species that might be in the area.

Treatment Responses

In July 2007, a twist tie formulation of the LBAM pheromone was registered in California. This new technology was quickly implemented. The application of the twist tie treatment is very labor intensive; therefore, this application is reserved for small outlier infestations. Any new outlier infestations are treated with the pheromone-infused twist ties (Table 2, Page 9).

The Department will continue to use twist ties in the small outlier infestations. As new technologies are developed and approved for use, they will be incorporated into the existing ground treatment plan.



Lawsuits were filed in Monterey and Santa Cruz counties challenging the aerial application of the pheromone and its emergency exemption from the California Environmental Quality Act. The plaintiffs prevailed in both instances. The CDFA was enjoined from conducting any LBAM eradication treatments in the two counties until the completion of an environmental impact report.

RAPID RESPONSE CONT.

Table 2. Ground Treatment Results

Area	Number of Twist Ties Deployed	Result
Pleasanton	9,043	Ongoing
Vallejo	78,277	Ongoing
Mare Island	12,810	Ongoing
Ross	5,556	Terminated*
San Rafael	31,993	Terminated*
Lafayette	6,666	Terminated*
Moraga	17,296	Terminated*
Treasure Island	20,144	Eradicated**
Yerba Buena	10,653	Eradicated**
Pescadero	41,803	Ongoing
Half Moon Bay	33,018	Ongoing
Carpinteria	55,523	Ongoing
Cupertino	17,058	Ongoing
Sunnyvale	9,306	Ongoing
San Jose (new sites)	11,086	Ongoing
Fremont	22,356	Ongoing
Union City	2,664	Ongoing

* These were isolated LBAM infestations that were engulfed by an expansion of the main infestation.

** Met the criteria to declare the treated infestation eradicated: no LBAM were detected during two life cycles of treatment followed by a third life cycle of intensive trapping.

Each 200 meter radius requires 450 to 500 person hours to complete within a timeframe to prevent LBAM from breeding.

Review of LBAM Predictions for 2009

In public meetings, the CDFA has made a series of predictions about what would happen if LBAM were not eradicated from the state. The predictions are:

1) LBAM numbers will continue to increase within the infested area and cause visible damage to agriculture, natural and urban landscapes.
2) LBAM will continue to spread to uninfested areas.
3) LBAM will invade agricultural lands and natural areas.
4) The current international quarantines will remain in place and that other countries may impose their own quarantines on products from the infested portions of California.
5) Growers will need to treat crops with pesticides to meet the quarantine regulations.
6) Growers, homeowners and land managers will treat with pesticides to control LBAM damage.
7) If untreated, LBAM populations and size of the infestation will become too large to control and eradicate.

Analysis of Predictions

Prediction 1) LBAM numbers will continue to increase within the infested area and cause visible damage to agricultural, natural and urban landscapes.

As the following table shows, LBAM numbers in 2008 rapidly increased in all areas by 10% to 500% over those seen in 2007. We see no indications that this trend will stop in the foreseeable future. LBAM numbers in California are still far below those seen in Australia and New Zealand. During a recent test to evaluate the efficacy of LBAM pheromone carriers in New Zealand, the monitoring traps caught upwards of three LBAM/trap/day. Our trap catch is 20 to 200 times lower than this.

RAPID RESPONSE CONT.

County	2007					2008					% Change
	# LBAM			# traps	LBAM/ Trap	# LBAM			# traps	LBAM/ Trap	2007 vs 2008
	06/05/07	09/20/07	June-Sept			06/06/08	09/19/08	June-Sept			
Alameda	143	296	153	2216	0.069	923	1487	564	3959	0.142	106
Contra Costa	73	104	31	2147	0.014	394	761	367	5239	0.070	400
Marin	11	22	11	915	0.012	366	498	132	1672	0.079	558
Monterey	246	500	254	2122	0.120	2647	3992	1345	3124	0.431	259
Napa	1	2	1	1328	0.001	2	5	3	1270	0.002	100
San Francisco	63	570	507	149	3.403	7160	10015	2855	188	15.186	346
San Mateo	11	33	22	2292	0.010	282	434	152	3270	0.046	360
Santa Clara	5	12	7	2960	0.002	58	89	31	7149	0.004	150
Santa Cruz	3109	6856	3747	3384	1.107	15633	20146	4513	3319	1.360	23
Solano	0	4	4	1378	0.0029027	15	20	5	1571	0.0031826	10

Data from Situation Reports are available on the web at: http://www.aphis.usda.gov/plant_health/plant_pest_info/lba_moth/index.shtml

Prediction 2) LBAM will continue to spread to uninfested areas.

As can be seen in the map below, the area of the state in which LBAM populations have been detected has increased by about 75% over that seen at the end of 2007. LBAM numbers in CA are still far below those seen in Australia and New Zealand.

RAPID RESPONSE CONT.

Prediction 3) LBAM will invade agricultural lands and natural areas.
LBAM larvae have been detected during field inspections of the following crops in 2008:

- Grapes
- Strawberries
- Rosemary
- Blueberries
- Raspberries
- Apples
- Lemons
- Tomatos

LBAM were detected in natural areas in Santa Cruz County in 2007. They continued to be detected in these areas in 2008.

LBAM Damage to Manzanita in Santa Cruz

Prediction 4) The current international quarantines will remain in place and that 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 LBAM 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 free of LBAM. Growers may treat with pesticide sprays, use cultural practices, inspections, etc. to achieve this reqirement.

Prediction 5) Growers will treat with insecticides to meet the quarantine regulations.
Pesticide Use Report data for 2008 are not yet available to quantify any increases in pesticide use by the growers or nursery owners to meet LBAM quarantine regulations. Anecdotal reports indicate that many nursery growers are treating to allow their stock to move out of the quarantine areas and that some growers of crops, especially berries, are treating to keep the larvae out of their harvested fruit.

Prediction 6) Growers, homeowners and land managers will treat to control LBAM damage.

CDFA developed two analyses[1] that predicted the potential increases in pesticide use that LBAM might cause in the urban and agricultural environments. For the microbial insecticide *Bacillus thuringiensis* (Bt), the annual increase ranges from 600-4,800 pounds of additional active ingredient or a 1.4% to 10.5% increase in the use of this material compared to that used on the same crops in 2006. For spinosad, the annual increase is estimated as 1,900 to 3,800 pounds of additional active ingredient or an increase of 10% to 20% of the 2006 use. For cryocide, the annual increase could be as large as 190,000 to 222,000 pounds of additional active ingredient or an increase of 31% to 36% 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 compared to that used in 2006. For Bt this means an additional 2,100 pounds of active material per year, or for 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 area.

The potential annual increase in homeowner insecticide use that LBAM might cause in the nine currently infested northern California counties 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 increases the estimate from 20,364 to 74,305 pounds of additional insecticide

1 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. CDFA Unpublished Report.

RAPID RESPONSE CONT.

per year added for the foreseeable future to the environment in 16 counties. 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.

Prediction 7) If untreated, LBAM populations and size of the infestation will become too large to control and eradicate.
At present, the LBAM TWG believes that the LBAM population numbers and distribution are still small enough to be eradicated. The situation is continuously evaluated before any tools are used for control or eradication.

Environmental Monitoring
Prior to the onset of any pesticide applications, the Department did consult with the CDPR to determine the necessary environmental monitoring requirements.

Bird Deaths Linked To Red Tide In Monterey Bay
In regards to the bird kill in Monterey Bay in November 2007, a California Department of Fish and Game (CDFG) report concluded: "It was not possible to determine with certainty the cause of the bird standings in the Monterey Bay area in November 2007. However, analytical results indicate that the cause was not the application of Checkmate-F for Light Brown Apple Moth, nor hydrocarbons, nor a cyanobacteria. Analytical results are consistent with an algal bloom as being a potential cause of the incidents."

A new study was released in February 2009 by researchers from the UC Santa Cruz, California Department of Fish and Game (CDFG), Monterey Bay Aquarium Research Institute (MBARI), and Moss Landing Marine Laboratories (MLML)--all members of the Central and Northern California Ocean Observing System (CeNCOOS)--linking the seabird deaths to a soap-like foam produced by red-tide alge. The study states: "In November-December 2007 a widespread seabird mortality event occurred in Monterey Bay, California, USA, coincident with a massive red tide caused by the dinoflagellate *Akashiwo sanguinea*. Affected birds had a slimy yellow-green material on their feathers, which were saturated with water, and they were severely hypothermic. We determined that foam containing surfactant-like proteins, derived from organic matter of the red tide, coated their feathers and neutralized natural water repellency and insulation. No evidence of exposure to petroleum or other oils or biotoxins were found. This is the first documented case of its kind, but previous similar events may have gone undetected. The frequency and amplitude of red tides have increased in Monterey Bay since 2004, suggesting that impacts on wintering marine birds may continue or increase."
It is important to note that reports of dead birds began several days prior to the aerial pheromone treatments in the area.
http://www.cdfa.ca.gov/phpps/PDEP/lbam/pdfs/docs/Birds_POneJournal_e4550.pdf

LBAM Peromone Had No Effect On Honey Bees
In regards to the claim that the program was responsible for a bee kill in the Monterey/Santa Cruz area, a UC Davis study found: "Contact and ingestion exposure to LBAM pheromones (a.i.) and LBAM-F® formulation (containing microencapsulated LBAM pheromones), at environmentally relevant and excessive concentrations resulted in no toxic effects to adult honey bees. Contact exposure to LBAM pheromones (a.i.) and LBAM-F® formulation did not cause mortality or adversely effect feeding or activity in the honey bee. Post exposure observations indicated bees looked normal, and not soaked or sticky after direct, close-range application of the CheckMate® LBAM-F spray. Neither movement nor flying of adult bees was impaired. Flying occurred as bees aged beyond 48 hours. Ingestion exposure to LBAM pheromones (a.i.) and LBAM-F® formulation (containing microencapsulated LBAM pheromones) did not affect mortality, feeding or activity in the honey bee at concentrations up to 1.0% LBAM-F® formulation by weight in their food. In preliminary studies, when offered a choice between MegaBee® and MegaBee® containing LBAM-F® formulation at 10%, bees consistently chose (3:1) to eat the MegaBee® without LBAM-F®. These results suggest that bees would be unlikely to collect or ingest CheckMate® microcapsules while foraging, reducing the likelihood that microcapsules would be ingested in the hive. In summary, ingestion and contact exposure tests conducted on CheckMate® LBAM-F were found to be non-toxic to bees."

RAPID RESPONSE CONT.

In response to a report claiming bee and other animal kill by the program, another UC Davis report concluded "The "Potential Effects" article (Upton et al., 2008) is primarily a discussion of the potential toxicity of trace, inert ingredients which are incorporated into the polyurea microcapsule shell in the CheckMate® LBAM-F formulation. However, the discussion focuses on the ingredients in their unreacted and unbound form, rather than as the microcapsule itself. Secondarily the article discusses the use of highly toxic methyl parathion which the LBAM Eradication Programs does not utilize. Both topics are irrelevant to a discussion of CheckMate® LBAM-F formulation toxicity to bees. The use of microencapsulated LBAM pheromones to disrupt mating and collapse LBAM populations is the USDA/CDFA preferred tool to combat the spread of the light brown apple moth in defined areas of high pest density. The USDA/CDFA chose the pheromone approach because of its non-toxic mode of action (USEPA, 2007a), and minimal effects to non-target receptors and the environment associated with its application (Berzoa et al.1975; Inscoe, 1992; Mihou, 2007; OECD, 2001; PMRA, 1994; Touhey, 1990; USEPA, 2007; Werner et al., 2007; Phillips et al., 2007; DPR, OEHHA, DPH, 2008; Monheit et al., 2008). Since it appears that no samples of dead or dying honey bees were collected and submitted for examination or analysis, there is no concrete evidence to support the claims of honey bee deaths presumed to be caused by an application of Checkmate® LBAM-F in Santa Cruz County in November of 2007. Laboratory tests on the Italian honey bee (*Apis mellifera*), with the full formulation of the microencapsulated LBAM pheromone product - CheckMate® LBAM-F, proved to be non-toxic to bees whether exposed to close range spray (at up to ten times the application rate), or via equally conservative oral exposures (Monheit et al., 2008)."

ENVIRONMENTAL IMPACT REPORT

The CDFA contracted with a consulting firm to produce an Environmental Impact Report (EIR) covering the Program activities. A series of public hearings were held statewide to gather public input on the content and scope of the EIR. The initial scope of the EIR was confined to the known infested counties. The public meetings were held 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 were held in Los Angeles, San Jose and Sacramento. A draft EIR will be available for public comment in summer 2009.

RESEARCH

Research is an integral part of the LBAM Project 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, such as the male moth attractant technology, 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. 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 LBAM Project; and
- Develop an effective DNA fingerprint and identification technology for LBAM.

RESEARCH CONT.

A) Trichogramma Wasps
Research by Dr. William Roltsch of CDFA and Dr. Nada Carruthers of USDA ARS have 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.

B) Male Moth Attractant Treatment
Male Moth Attractant Treatment involves mixing the LBAM pheromone with an insecticide (permethrin) and a carrier. This matrix is deposited as discrete spots of about 5 ml (teaspoon) at a height at or above 8 feet on street trees and utility poles throughout an area. The male moths are attracted to the spots and are killed as they move over the pheromone-permethrin spot looking for a female moth. This technology is used against other moths in the eastern United States and it can be used in conjunction with the release of Trichogramma wasps. Initial tests have found that the permethrin does not easily wash out of the mixture even with the equivalent of an inch of rain running over the mixture. Another preliminary study found that the permethrin is lost from the mixture through photo-degradation and the pheromone through evaporation in a linear fashion. This means that we will likely be able to predict how fast the two materials leave the mixture. This is important in operational planning.

C) 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. A starter LBAM colony has been established which will be used to start the large rearing colony. A site for the large rearing colony has been secured in Moss Landing, Monterey County. Equipment needed for the large colony has been ordered and started arriving in December. This technology will take a minimum of two to three years to fully implement.


Trichogramma Wasp
Photo from Arbico Organics
web site

Develop methods to control LBAM if eradication is not feasible:

A) 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.

B) Classical Biological Control
Department scientists are working with the 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 are under going host range testing. This technology will not be ready for at least three years.

C) Evaluate Existing Natural Enemies in CA
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 one larval parasite and at least two egg parasites; one of which is not native to California.

D) Develop data on the possible environmental impacts of any eradication or control method used by the LBAM Program
The Program has contracted with the University of California at Davis and the CA Department of Fish and Game to confirm the non-toxic effects of the pheromone in various formulations on fresh water animals.

E) Develop an effective DNA fingerprint and identification technology for LBAM
This will allow the Program to identify potential sources of the LBAM infestations and then close the pathway to future introductions of LBAM in the state.

F) Develop efficacy data for alternatives to organophosphate pesticide treatments for LBAM-infested nursery stock
The Program in cooperation with USDA and Australian researchers is conducting pesticide trials in order to evaluate the efficacy of non-organophosphate pesticides against LBAM. Several oil-based combinations have proven effective and they are being integrated into the LBAM regulatory program.

RESEARCH CONT.

Research Symposium

The Program sponsored an LBAM symposium at the National Entomological Society of America annual meeting in Reno in November. The agenda was:

Light Brown Apple Moth *(Epiphyas postvittana)*---A New Quarantine Problem
Organizers: Danny J. Hamon and Robert Dowell
Introductory Remarks

Overview of the light brown apple moth problem in California: Threat and response
Robert Dowell, California Dept. of Food and Agriculture

Quarantine issues of the California light brown apple moth regulatory program
Robert Dowell, California Dept. of Food and Agriculture; Danny J. Hamon, USDA-APHIS-PPQ

Visual morphological identification of the light brown apple moth and other Tortricidae in California
Marc Epstein, California Dept. of Food and Agriculture; Todd M. Gilligan, Colorado State University

Molecular diagnostics of LBAM: Species recognition and population structure
Norman Barr, Center for Plant Health Science and Technology

Denying sex to gain control: Mating disruption as a tool against light brown apple moth
David R. Lance, USDA-APHIS-PPQ

USDA-ARS light brown apple moth research update
Eric Jang, USDA-ARS

Biological control of the light brown apple moth using natural enemies
Nicholas Mills, University of California, Berkeley; William Roltsch, California Dept. of Food and Agriculture

The development of sterile insect technique (SIT) control methods to suppress the light brown apple moth (*Epiphyas postvittana*) in California.
Gregory S. Simmons, USDA-APHIS; Nada Caruthers, USDA-APHIS

Larva in Lemon

Pupae and Webbing

FINANCIAL STATEMENT

Total Expenditures For Fiscal Year 2007/2008

Personnel Services	$2,099,345
Operating Expenses	$16,386,833
Total Net Program	**$18,486,178**

Fund Sources

General Fund	$2,000,000
Federal Funds	$16,486,178
Total Funding	**$18,486,178**

ATTACHMENT 1

-2008-

CALIFORNIA
DEPARTMENT
OF FOOD AND
AGRICULTURE

PLANT HEALTH AND
PEST PREVENTION
SERVICES