

Light Brown Apple Moth in California

California Department of Food and Agriculture
United States Department of Agriculture

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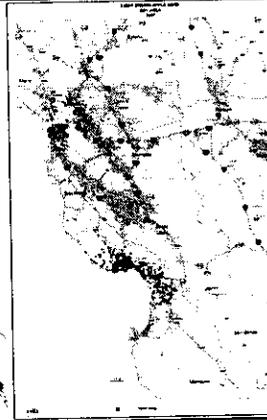


The Problem

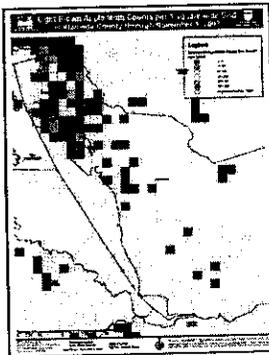
- The Light Brown Apple Moth has been identified for the first time on the North American Continent.
- The Central Coast and the San Francisco Bay region represent the extent of the infestation.
- If allowed to become permanently established, this invasive pest represents a significant risk to the environment & economy.

How Did LBAM Get to California?

- It probably arrived in California on live plant material from Australia or New Zealand.
- The current infestation is a result of spread from both natural dispersal and human-aided movement of infested plant material.



LBAM Counts in Alameda County



What Happens if Nothing is Done?

- All of California will be in perpetual quarantine.
- Increased pesticide use will occur in order to reduce the impact of LBAM in urban landscapes and agricultural commodities.
- The moth will eventually spread to other areas of California, the U.S., and beyond.

What Happens if Nothing is Done?

- Populations of threatened and endangered plant species could be severely impacted should this moth adapt to feeding on them.
- The impact on production costs for LBAM is estimated at \$160 - \$640 million annually just in the 9 currently infested counties.

Why is This Project an Emergency?

- Recent introduction in North America.
- Extensive host list.
- Multiple generations per year.
- Potential for uncontrolled spread and environmental & economic impacts.
- Populations are still small, eradicable.

Decision-making Process

- We employ a question-based decision matrix to guide our actions. Consultation with stakeholders is part of the process.
- Has there been a successful eradication program of this type of insect elsewhere?
- Are there effective eradication/control measures for the target pest or closely-related species?
- Are these tools available for use in California?
- Are these tools likely to be effective if used in California?

Decision-making Process

- Are there environmental circumstances that will likely limit the effectiveness or operational aspects of the tools? (Especially important as we generally eradicate invading insects in urban settings).
- Are there operational constraints that will limit the effectiveness of the tools?

Goals for Eradication/Control

- Base decisions on sound science and the best available technology
- Design programs to minimize the environmental impacts
- Provide accurate public information
- Effectively use integrated control methods when eradication is not feasible

Host List

- Over 2,000 plant species are hosts including:
- **Native Species**
 - cypress, oak, willow, Monterey pine, redwood, lupines
- **Horticultural Plants**
 - roses, shrubs, flowers, landscape plantings
- **Crops**
 - peaches, plums, nectarines, apples, pears, citrus, peaches, avocados, grapes, cherries, walnuts, vegetables

Larva Feeding on Apple



Some Biological Attributes of LBAM

- A single female can give rise to over 1 billion offspring per year if all survive. Even if 90% die, a single female can still give rise to over 1 million offspring per year.
- Each male trapped represents up to 16.7 males in the population. There is a 1:1 sex ratio so each trapped male also may represent up to 16.7 females.



Hand-lens view: Mature LBAM caterpillars eat flowers and young bunches of grapes. (Photo credit: DeAnn Glenn)

Some Biological Attributes of LBAM

- Larvae eat some 2,000 types of plants. Most are common plants in our gardens, parks, forests and crop lands.
- The moths develop at temperatures above 45.5° F. This means continuous development in much of the state. There are up to four generations possible per year.
- Females can lay 300-500 or more eggs each.



Summer-generation LBAM caterpillar feeding on maturing grape bunch. (Photo credit: Greg Baker)

Environmental Consultation

- Fish & Wildlife Service
- Coastal Commission
- Nat'l Marine & Fisheries Service
- Monterey Bay Nat'l Marine Sanctuary
- Central Coast Regional Water Quality Control Board

How are LBAM Collected and Identified?

- Adult males are lured to pheromone-baited detection traps, and immature stages can be visually collected from plants.
- CDFA maintains a statewide trapping program to help us find infestations early.
- Trap results indicate the problem is restricted to the Central Coast and SF Bay region.

What Actions Have We Taken?

- Implemented statewide trapping program.
- Convened technical working group.
- Prevented the artificial spread.
- Initiated eradication efforts.
- Provided treatment details to local, county, and state officials and local media to communicate details to the public.
- Developed an Environmental Task Force.

Expanded Outreach Efforts

- Meetings with editorial boards
- Expanded meeting schedule prior to treatment
 - Public meetings
 - Briefings for local officials
 - Presentations for community groups
- Frequent internal meetings on outreach plans
- Engaged a public relations firm to extend our outreach

Treatment Program

- Mating disruption technique began Fall 2007
 - Two aerial applications of pheromone - 30 days apart Seaside/Monterey.
 - Using Checkmate OLR-F and LBAM-F
 - One aerial application North County & Santa Cruz
 - Checkmate LBAM-F
 - Suppress the moth this year.
- Pheromone treatment in 2008
 - Beginning in the early Spring.
 - Treat for at least two lifecycles.

The Technology

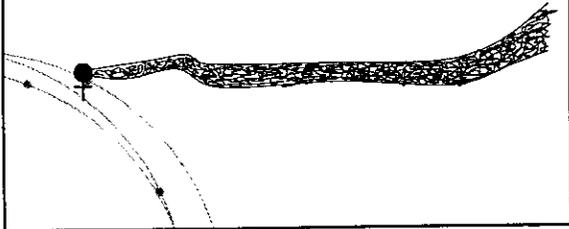
- Ground treatment options
 - Pheromones (twist-ties)
 - Bt
- Aerial treatment options
 - Existing pheromone technology
 - Future pheromone technology
- Future options
 - Sterile moths
 - Natural enemies
 - Biorational technologies

The Pheromone

- Works to confuse male moths by mimicking the female's scent.
- Intent is to disrupt the mating cycle.
- No effects on most non-target insects, including butterflies such as the Monarch or the Blues.
- Will impact closely-related Tortricid moths

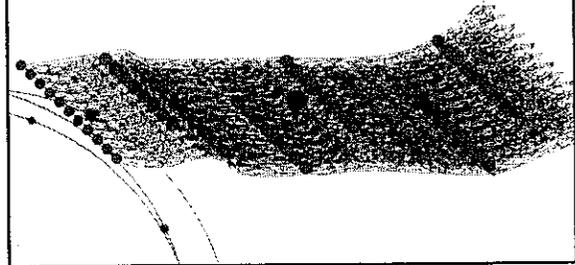
Mating disruption:

The female LBAM gives off a mating pheromone to attract a male LBAM.



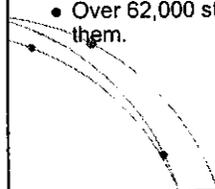
Mating disruption:

The green dots represent the pheromone from the aerial treatment, creating the illusion of the female LBAM being everywhere.



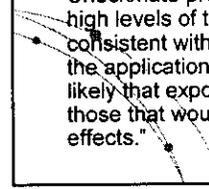
Twist-tie Alternative

- The area is too large for the reasonable deployment of twist ties.
- Over **9.5 million** twist ties would be required for the Monterey Peninsula area alone.
- Over 62,000 staff would be needed to place them.



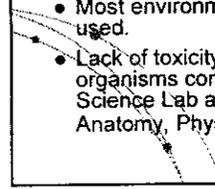
Health Concerns

- White paper consensus statement on human health aspects of the aerial application of pheromones to combat the LBAM (Oct. 31, 2007, DPR/OEHHA/DPH).
- "While the toxicological information on the Checkmate product indicates that exposure to high levels of the applied material would be consistent with many of the reported symptoms, the application rate was extremely low, and it is likely that exposure occurred at levels below those that would be expected to result in health effects."



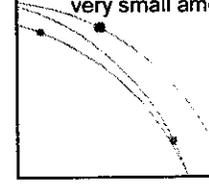
How Will the Treatment Affect the Aquatic Environment?

- Treatments will not be made over bodies of water, leaving aquatic species unaffected.
- The pheromone is not soluble in water and is biodegradable. Disperses into the air and breaks down rapidly.
- Most environmentally-friendly treatment ever used.
- Lack of toxicity to marine and freshwater organisms confirmed by UC Davis Marine Science Lab and UC Davis Department of Anatomy, Physiology and Cell Biology.



Product Labeling

- All EPA registered products require minimum labeling "keep out of reach of children."
- Label precautions are intended to alert those who mix and handle the product.
- If any, the public would come in contact with a very small amount of the applied material.



Precaution Information

- Some people wish to avoid unnecessary exposure;
- So, applications are made at night to minimize inconvenience to the public;
- and our notice includes recommendations to minimize exposure.

What Happens Next?

- Technical Working Group met last week to review program, and to provide recommendations for 2008.
 - They considered alternative methods for delivering the pheromone that are just as safe and may require fewer applications.
- CDFA and USDA will consider the TWG's recommendations.

Next Steps

- Eradication activities throughout the entire infested Coastal/Bay Area region 2008-09.

Information Available

- CDFA and USDA have information available to the public via the following web sites:
 - www.cdfa.ca.gov
 - www.aphis.usda.gov
- Sites are refreshed as new information is available and as new maps and quarantine areas are updated.
- New e-mail address for contacting CDFA: lbam@cdfa.ca.gov

