

# The Light Brown Apple Moth: Situation Overview

June 3, 2008

*Prepared by:*

Gabrielle Bravo, Sandie Schmaier, Christine Gardner, Lisa Labon, Eleanor Bigelow

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# Agenda

- Background
- The Aerial Spraying Plan
- Problems with the Plan
  - Not Safe
  - Not Effective
  - Not Necessary
- Current State of Affairs
- Action



# BACKGROUND

# Light Brown Apple Moth: Photos<sup>1</sup>



Female LBAM



Male LBAM



Newly Laid LBAM Eggs



Mature LBAM Larva



# Background

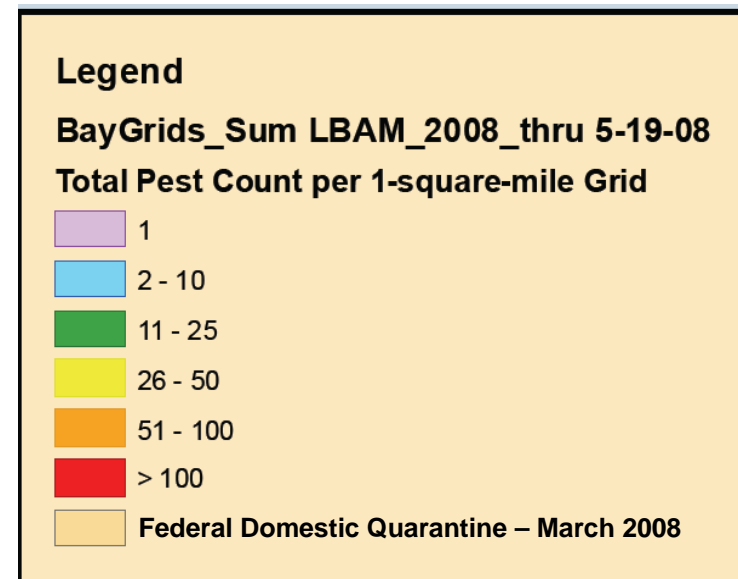
- The Light Brown Apple Moth (LBAM) is native to Australia<sup>2</sup>
- United States began to restrict product imports from Australia/New Zealand 30 years ago due to concerns about potential damage to United States' crops from the LBAM<sup>3</sup>



# Background: 2007-2008

- The LBAM was first reported in California in February 2007. The USDA confirmed the presence of the LBAM in California through genetic testing on March 22, 2007<sup>4, 5</sup>
- Scientists disagree as to how long the LBAM has been present in California<sup>6</sup>
- CDFA classified the LBAM as a “Class A Pest” and declared “Emergency Conditions”<sup>7</sup>
- On April 20, 2007, the CDFA issued a State Interior Quarantine order to restrict shipments of plant materials from affected counties; The USDA Animal and Plant Inspection Service followed suit with a Federal Domestic Quarantine on May 2, 2007<sup>8</sup>
- CDFA and USDA developed an eradication plan relying on aerial spraying of a pheromone on June 8, 2007<sup>9</sup>
- USDA exempted the treatment plan from having a full environmental impact report prepared prior to the start of the spraying due to the “emergency”<sup>10</sup>
- First sprayings in Monterey and Santa Cruz in September, October and November 2007 resulted in 643 health complaints<sup>11</sup>
- The CDFA eradication plans include:<sup>12</sup>
  - Ground treatments, including twist tie placements and stingless parasite wasp releases
  - Trapping actions
  - Aerial spraying, scheduled to begin in the Bay Area in October 2008

# LBAM Distribution and Density<sup>13</sup>

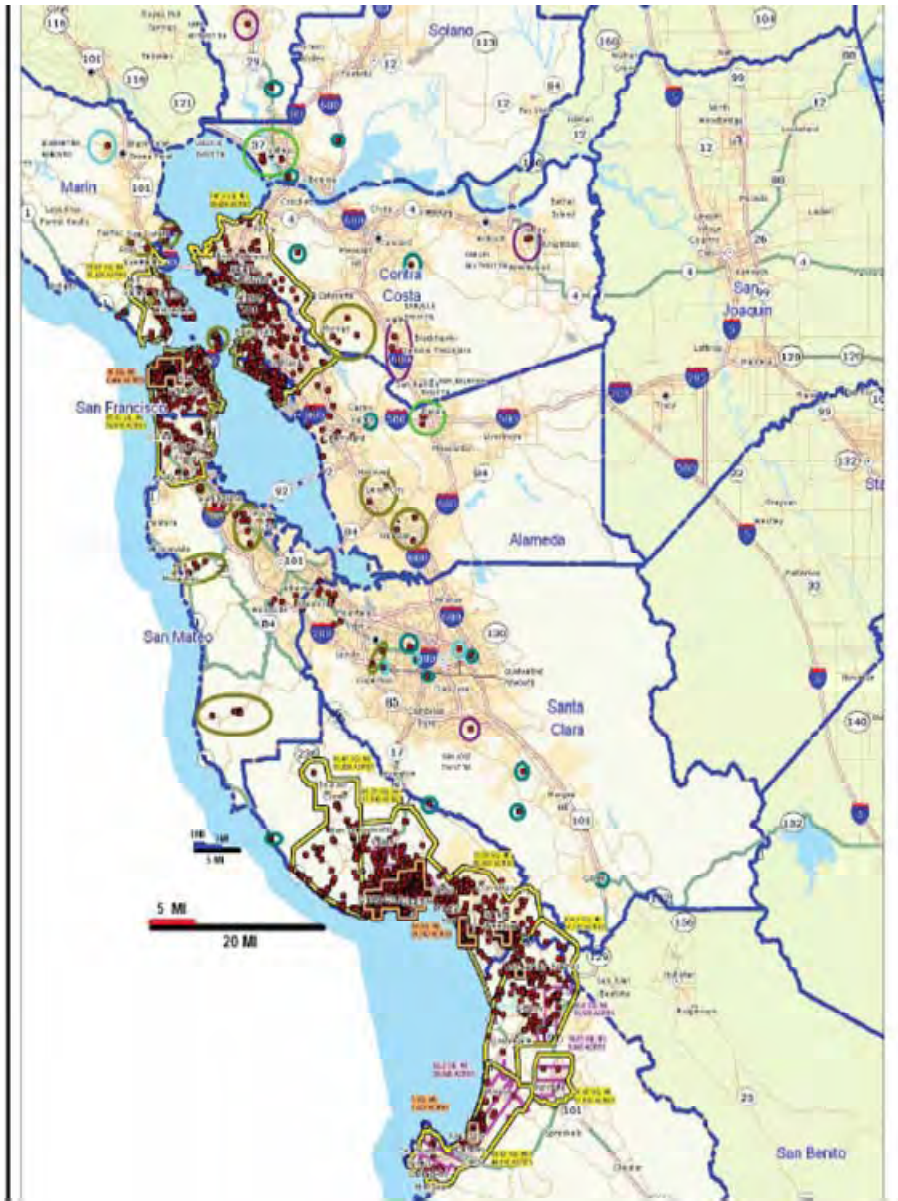






# THE AERIAL SPRAYING PLAN

# Map of Areas to be Sprayed<sup>15</sup>



- Legend:
- 2007 / 2008 Trap Find
  - Quarantine Removed
  - Eradication Area
  - Eradication Completed
  - Delimitation Trapping
  - ▬ Aerial Treatment 2007
  - ▬ Proposed 200M Twist Tie
  - ▬ Proposed Aerial Treatment
  - ▬ Proposed Wasp



# Cities to be Sprayed<sup>16</sup>

- San Francisco County

- San Mateo County

- Broadmoor
- Brisbane
- Colma
- Daly City
- Pacifica
- San Bruno
- South San Francisco

- Alameda County

- Alameda
- Albany
- Berkeley
- Emeryville
- Oakland
- Piedmont

- Contra Costa County

- El Cerrito
- El Sobrante
- Hercules
- Kensington
- Pinole
- Richmond
- San Pablo

- Marin County

- Belvedere
- Corte Madera
- Larkspur
- Sausalito
- Tiburon

- Monterey County

- Aromas
- Castroville
- Del Rey Oaks
- Los Lomas
- Marina
- Monterey
- Pacific Grove
- Pajaro
- Pebble Beach
- Prunedale
- Salinas
- Seside

- Santa Cruz County

- Aptos
- Ben Lomond
- Boulder Creek
- Corralitos
- Felton
- Freedom
- Live Oak
- Rio Del Mar
- Santa Cruz
- Soquel
- Scotts Valley
- Watsonville



# Eradication Plan Details

- Centerpiece of plan is the aerial spraying of a pheromone-based solution called CheckMate, which confuses male LBAMs and prevents mating<sup>17</sup>
  - CheckMate was developed by Suterra LLC, a subsidiary of Roll International Corporation. Roll International Corp. is owned by Stewart Resnick<sup>18</sup>.
    - Roll International Corp. also owns Paramount Farms and Paramount Citrus, two of the largest United States growers of nuts and citrus<sup>19</sup>
    - Roll International Corp also owns FIJI Water<sup>20</sup>
    - Resnick has given almost \$150,000 to Schwarzenegger's campaigns<sup>21</sup>
- Spraying schedule to start in the Bay Area in October 2008<sup>22</sup>
- Spraying to occur at night every 30-90 days, 9 months of the year, for at least 2 years<sup>23</sup>
- Safety instructions from the CDFA<sup>24</sup>:
  - Remain indoors if possible during the applications
  - Cover patio furniture, BBQs, and anything else left outside during the applications. If these articles are left outside uncovered, wash these articles following the application
  - Do not leave laundry outdoors during application
  - Rinse all fresh fruit and vegetables before eating



# The Aerial Spraying Plan: NOT SAFE



# Not Safe

- The known inert ingredients have not been tested for their long term health effects in humans<sup>25</sup>
- Regardless of the chemicals, the microscopic size of the capsules can lead to permanent lung problems<sup>26, 27</sup>
  - Particles that are 10 microns in diameter or less can penetrate deep lung tissue<sup>28</sup>
  - There is debate as to the percentage of Checkmate particles that are less than 10 microns in diameter; at minimum, it is 1.2%<sup>29</sup>
- Children, elderly, and other vulnerable populations are most at risk<sup>30</sup>



# Not Safe

- Suterra released the ingredients (but not amounts) of CheckMate under pressure from the public and the Governor.<sup>31</sup>
  - Water
  - (E)-11-Tetradecen-1-yl Acetate (pheromone)
  - (E,E) -9,11 Tetradecadien-1-yl Acetate (pheromone)
  - Crosslinked polyurea polymer
  - Butylated Hydroxytoluene
  - Polyvinyl Alcohol
  - Tricaprylyl Methyl Ammonium Chloride
  - Sodium Phosphate
  - Ammonium Phosphate
  - 1,2-benzisothiazoli-3-one-2-hydroxy-4-n-octyloxybenzophenone
- The CDFA and Suterra, the proprietor of CheckMate, refuse to make public the concentrations of the chemical ingredients
- Female LBAM naturally produce the same pheromones found in CheckMate. Male LBAMs find mating partners by detecting the pheromones produced by female LBAM. CheckMate works by releasing LBAM pheromones into the environment, thereby making it difficult for male LBAMs to find mating partners.



# The Aerial Spraying Plan: **NOT EFFECTIVE**



# Not Effective

- Eradication of a pest species through mating disruption alone has never been attempted and is very unlikely to succeed<sup>32</sup>
- The track record in California of eradicating pests as widespread as the LBAM indicates little or no chance of success<sup>33</sup>
- There is no monitoring system for delineating the full extent of the infestation at the beginning of the program, or for identifying scattered pockets in advanced stages<sup>34</sup>

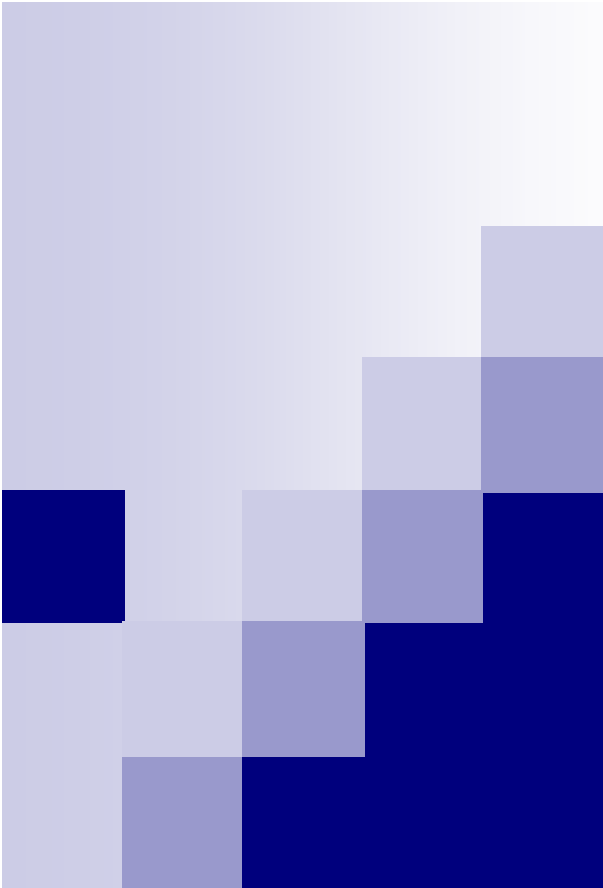


# The Aerial Spraying Plan: NOT NECESSARY



# Not Necessary

- LBAM is *NOT* a human health threat
- The risk of LBAM spread to the Central Valley is low
  - Many scientists believe the LBAM has been in California for decades<sup>35</sup>
  - The LBAM is unlikely to establish itself in an area with temperatures too high for optimal reproduction<sup>36</sup>
- No LBAM crop damage in California has been reported to date<sup>37</sup>
- LBAM classification as a “Class A Pest” is simply incorrect and should be changed<sup>38</sup>
- Alternative strategies are available<sup>39</sup>:
  - Containment
  - Traps
  - Natural Predators

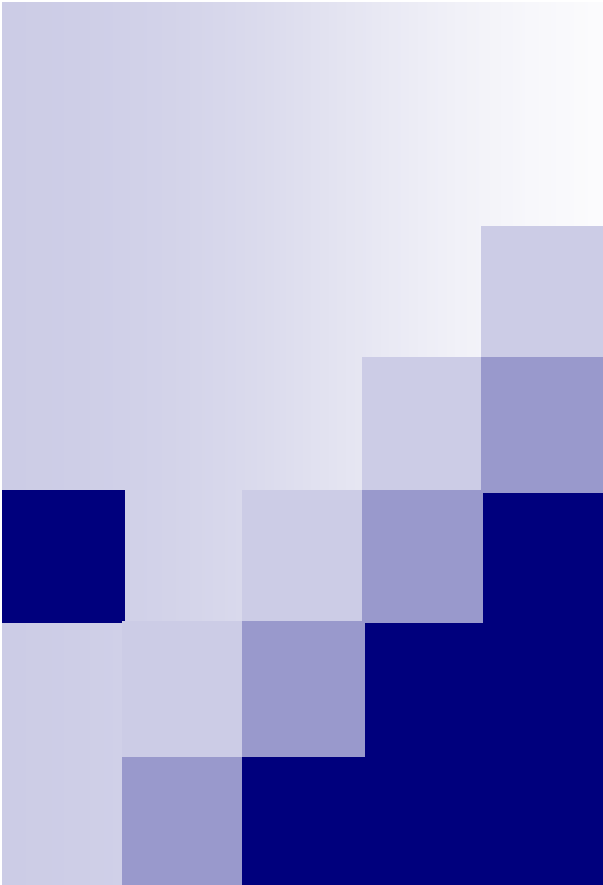


# CURRENT STATE OF AFFAIRS



# Current State of Affairs

- Cases filed in Monterey; Monterey judge ruled the “emergency” was invalid<sup>40</sup>
  - CDFA is appealing<sup>41</sup>
- State is planning a “6-Pack” of tests<sup>42</sup>
  - Insufficient to address repeated small dose exposure<sup>43</sup>
- State Senate Environmental Quality Committee unanimously passed a resolution opposing the spraying, but no real legislation is underway<sup>44</sup>
- In May 2008, the USDA abolished it’s 17 year program of publishing a detailed national survey on pesticide use<sup>45</sup>
- Further postponements are possible, but realistically, Governor Schwarzenegger is the best hope to stop the spraying at this point



# ACTION



# Action: What we Need to Do

## ■ Political Outreach

- Supervisors, State Senators, Governor

## ■ Media Outreach

- Local papers, radio stations, TV stations, national media

## ■ Outreach to affected groups that could exert influence:

- Schools, hospitals, hotels, convention center, tourist areas, night businesses and workers



# Action: Political Outreach

## ■ Governor Arnold Schwarzenegger.

- Urge him to protect 7 million Californian citizens, as well as vast acreages of our environment, by imposing a gubernatorial moratorium against the Spray in California.
- Address: State Capitol Building, Sacramento, CA 95814
- Phone: (916) 445-2841

## ■ Mayor Gavin Newsom.

- Ask him to uphold his green Mayor reputation by raising the visibility of this issue, filing litigation against the State of California and encouraging Rep. Pelosi to make reclassification of the light brown apple moth priority #1.
- Address: City Hall, Room 200, 1 Dr. Carlton B. Goodlett Place, San Francisco, CA 94102
- Phone: (415) 554-6141

## ■ Representative Nancy Pelosi.

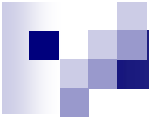
- Urge her to make the reclassification of the light brown apple moth her top priority, as the health and lives of millions of Californians (in her hometown!) may suffer negative impact from this program.
- Address: District Office: 450 Golden Gate Ave., 14th Floor, San Francisco, CA 94102
- Phone: (415) 556-4862

## ■ San Francisco City Attorney Dennis Herrera.

- Reinforce the public's expectation that he follow the referendum passed by our Board of Supervisors to aggressively prepare litigation against the State of California on the LBAM issue.
- Address: Office of the City Attorney, City Hall, Room 234, San Francisco, CA 94102
- Phone: (415) 554-4700; (415) 554-4745 - fax


## ■ Congressman Sam Farr (who sits on the Agriculture Committee in Washington).

- Ask him to introduce a bill demanding the reclassification of LBAM.
- Address: Santa Cruz Office, 701 Ocean Street, Room 318, Santa Cruz, CA 95060
- Phone: (831) 429-1976




# Endnotes (page 1 of 4)

1. UC Integrated Statewide Pest Management Program. Light Brown Apple Moth in California: Quarantine, Management, and Potential Impacts. July 17, 2007. Pages 1, 6-7.
2. California Department of Food and Agriculture. Light Brown Apple Moth Brochure. February 15, 2008. Page 3.
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4. California Department of Food and Agriculture. Light Brown Apple Moth Quarantine Covers at Least 182 Square Miles in Five California Counties. April 20, 2007. Page 1.
5. United States Department of Food and Agriculture Animal and Plant Health Inspection Service. Plant Health: Light Brown Apple Moth. Page 1.
6. Carey, James. Invasion Biology of the Light Brown Apple Moth. March 12, 2008.
7. UC Integrated Statewide Pest Management Program. Light Brown Apple Moth in California: Quarantine, Management, and Potential Impacts. July 17, 2007. Page 2.
8. Ibid.
9. California Department of Food and Agriculture. 2008 – 2009 Light Brown Apple Moth Action Plan. April 29, 2008. Page 1.
10. UC Integrated Statewide Pest Management Program. Light Brown Apple Moth in California: Quarantine, Management, and Potential Impacts. July 17, 2007. Page 4.
11. Lynberg, Mike and Dilworth, David. Complaints of Adverse Reactions to Aerial Spraying in Monterey and Santa Cruz Counties. January 3, 2008. Page 1.
12. California Department of Food and Agriculture. 2008 – 2009 Light Brown Apple Moth Action Plan. April 29, 2008. Page 4.



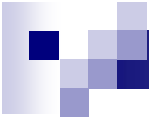
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13. Animal and Plant Health Inspection Service, US Department of Agriculture. Light Brown Apple Moth Distribution and Density in California. Collected Jan 2 – May 19, 2008.
14. Aquino, Harder, Kimes, & Rosendale. Light Brown Apple Moth: Implications for California Agriculture. April 1, 2008. Page 8.
15. California Department of Food and Agriculture. Light Brown Apple Moth, Bay Area, Proposed for 2008. February 15, 2008.
16. California Department of Food and Agriculture. 2008 – 2009 Light Brown Apple Moth Action Plan. April 29, 2008. Page 4.
17. California Department of Food and Agriculture. Light Brown Apple Moth Brochure. February 15, 2008. Page 3.
18. Forbes.com. America's Largest Private Companies - #312 Roll International. November, 2007. Page 1.
19. Hoovers. Roll International Corporation Company Description. 2008. Page 1.
20. Ibid.
21. Yi, Matthew. San Francisco Chronicle. Pesticide Maker Owned by Political Donor. March 8, 2008.
22. California Department of Food and Agriculture. 2008 – 2009 Light Brown Apple Moth Action Plan. April 29, 2008. Page 4.
23. Ibid.
24. California Department of Food and Agriculture. What are CheckMate OLR-F and CheckMate LBAM-F?. Page 1.



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25. Haiden, Ann. The Light Brown Apple Moth Aerial Spray Campaign: The Health Hazards of Particles, Toxins, Inflammatory Cascades and Genomic Predisposition. May 15, 2008.
26. Song, Elisa and Daniel, Dawn. Letter to Governor Arnold Schwarzenegger and Secretary Kim Belshe. May, 2008. Page 1.
27. Some scientists disagree with the CDFA regarding the percentage of particles in CheckMate that are smaller than 10 microns in diameter. The CDFA claims that no more than 1.2% of the CheckMate particles are smaller than 10 microns in diameter. Some scientists, most notably Dennis Knepp and Jeff Haferman, question the logic of the calculations of the CDFA and believe that a significant percentage of CheckMate particles are smaller than 10 microns in diameter. The EPA refers to particles smaller than 10 microns in diameter as PM 10 (particulate mater 10). The EPA states that "Small particles less than 10 micrometers in diameter pose the greatest problems, because they can get deep into your lungs, and some may even get into your bloodstream." (<http://www.epa.gov/air/particlepollution/health.html>)
28. Rose, Lawrence. Marin Pesticide Spraying Health Hazard Alert. Page 1.
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37. California Department of Food and Agriculture. Light Brown Apple Moth Eradication Program: Key Questions and Issues. October 26, 2007.
38. Aquino, Harder, Kimes, & Rosendale. Light Brown Apple Moth: Implications for California Agriculture. April 1, 2008. Page 6.
39. Natural Resources Defense Council. NRDC Position Statement on Spraying for the Light Brown Apple Moth in California. November 14, 2007. Page 3.
40. San Francisco Chronicle. Judge Halts Moth Spraying in Monterey County. May 13, 2008.
41. Ibid.
42. Song, Elisa and Daniel, Dawn. Letter to Governor Arnold Schwarzenegger and Secretary Kim Belshe. May, 2008. Page 2.
43. Ibid.
44. California Senate Committee on Environmental Quality. SCR 87. April 28, 2008. Page 1.
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- Leavitt, Robert. RE: Your letter dated May 14, 2008. May 23, 2008.
- California Department of Food and Agriculture. Plant Industry Guidelines for Establishing or Changing Pest Ratings. April 28, 1989

# BACKUP

June 3, 2008

*Prepared by:*

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# 2008 – 2009 Light Brown Apple Moth Action Plan

April 29, 2008

*CDFA explanation of their Light Brown Apple Moth treatment strategy. Cites aerial spraying as the primary method.*

## 2008 – 2009 Light Brown Apple Moth Action Plan Updated April 29, 2008

This action plan has been developed by the California Department of Food and Agriculture (Department) and the United States Department of Agriculture (USDA) in consultation with representatives of the Light Brown Apple Moth Technical Working Group. This action plan is a guide to the major elements and strategies of the eradication program. Specific program actions will be modified based on the circumstances of new local infestations and operational constraints.

The following treatment plan will be implemented by the Department and the USDA in cooperation with the county agricultural commissioners. These actions will apply to all infested counties within California.

### 1. Eradication strategy:

#### **Overall strategy: Eradication is the goal.**

- 1.1. Eradication of the light brown apple moth (LBAM) populations will likely take several years to accomplish using several treatment tools. Some of the tools that may be used are currently under development.
- 1.2. Eradication of LBAM will require an integrated systems approach using multiple tools, including applications of pheromone for mating disruption, use of insecticide treatments, male moth attractant treatment technology (ground treatment), and implementation of biological control and releases of sterile insects (if needed and when available).
- 1.3. The primary tool for eradication will be the aerial application of pheromone for mating disruption.
- 1.4. Decisions regarding eradication activities will be based on the geographic size and population densities as follows:
  - 1.4.1. Treating the outlier infestations;
  - 1.4.2. Treating the small and isolated infestations; and,
  - 1.4.3. Treating the heaviest populations beginning with Monterey and Santa Cruz counties, then moving to the San Francisco Bay Area.
- 1.5. The Department will consult with the California Department of Pesticide Regulation (DPR) concerning pesticide use in the LBAM eradication program.
- 1.6. Buffer areas will continue to be used to protect any threatened or endangered species or other environmentally sensitive areas.

2. Ground treatments:

A focused ground treatment component for small and isolated areas (5 miles from another infested area) as described below will be used as a stand alone treatment and/or to complement mating disruption treatments against the heaviest populations.

2.1. Pheromone twist tie placement for mating disruption:

2.1.1. Twist Tie deployment is on-going.

2.1.2. Areas designated for twist tie placement:

- Isolated sites;
- Areas that are further than 5 miles from a generally infested area; and,
- Areas with low level populations.

2.1.3. Twist ties are placed at the rate of 250 twist ties per acre in a 200 meter radius around each infested site.

2.1.4. Twist ties remain in place for two life cycles and are replaced every three to six months as needed to maintain pheromone at disruption levels.

2.1.5. Trap density for small isolated outlier sites will be 100 traps in the core and 25 traps per square mile in the surrounding eight square miles.

2.1.6. After two life cycles without any LBAM detections, the twist ties are removed. Delimitation traps will remain in place for one additional life cycle. If no additional LBAM are detected, this area will be declared free from LBAM and trapping levels will return to detection levels.

2.2. Pheromone male moth attractant treatment:

2.2.1. Anticipated start date is summer 2008, targeting the following areas:

- Areas that cannot be treated aerially (such as proximity to environmentally sensitive areas, buffer zones);
- Contiguous areas with a low level of LBAM detections;
- Contiguous areas with heavy populations (more than 50 LBAM detections) conducted in advance of the aerial mating disruption to enhance the efficacy of the aerial mating disruption pheromone applications.

2.2.2. The treatment area consists of a 1.5 mile radius around any detection site.

- 2.2.3. Treatments may occur on trees and utility poles on public and private property. Male attractant treatment sites will be out of reach of the general public.
  - 2.2.4. Treatments will occur at 30 to 60 day intervals.
  - 2.2.5. Treatments will be applied at a target rate of 3,000 male attractant treatment sites per square mile.
  - 2.2.6. Trap density will be nine traps per square mile throughout the treatment area.
  - 2.2.7. After two life cycles of treatment without any LBAM detections, treatments will cease. Delimitation traps will be deployed and they will remain in place for one additional life cycle. If no additional LBAM are detected, this area will be declared free from LBAM and trapping levels will return to detection levels.
- 2.3. Inundative *Trichogramma* species stingless parasite wasp releases:
- 2.3.1. Anticipated start date is summer 2008.
  - 2.3.2. These releases may be made in advance of aerial mating disruption pheromone applications in the following areas (more than 50 LBAM detections):
    - Santa Cruz County (Santa Cruz, Soquel);
    - San Francisco County (Golden Gate Park);
    - Monterey County (Carmel, Seaside/Marina).
  - 2.3.3. Estimated number to be released is 1,000,000 per square mile (based on previous history with these or other species).
- 2.4. Foliar ground treatments with Spinosad or *Bacillus thuringiensis kurstaki* may be made where heavier larval populations are detected.

### 3. Aerial Applications:

Aerial applications of pheromone for mating disruption will be used to treat denser populations ([2008 LBAM Plan PDF Map](#)).

- 3.1. New formulations of the mating disruption pheromone are now available. These formulations will be tested to determine which formulation is the most efficacious at eradicating LBAM. The California Office of Environmental Health Hazards Assessment (OEHHA) will evaluate the anticipated human health impacts of the formulation used over urban areas and transmit these to physicians in the treatment areas. The area for aerial applications is a 1.5 mile radius around each location where a LBAM is detected. Application

areas may be adjusted to include LBAM detections in proximity to the 1.5 mile radius and to provide the public with identifiable treatment boundaries.

- 3.2. Anticipated start date for aerial application of pheromone for mating disruption over all of the heavier infested areas of Monterey and Santa Cruz Counties including: Aptos, Aromas, Ben Lomond, Boulder Creek, Castroville, Corralitos, Del Rey Oaks, Felton, Freedom, Live Oak, Los Lomas, Marina, Monterey, Pacific Grove, Pajaro, Pebble Beach, Prunedale, Rio Del Mar, Salinas, Santa Cruz, Soquel, Scotts Valley, Seaside and Watsonville (currently 282,699 acres) is August 17, 2008, with a 30 to 90 day spray interval, depending on the formulation used, and will continue through the reproductive flight periods of the LBAM (approximately nine months) as pheromone is available.
- 3.3. Applications targeting the following areas (currently not prioritized) are anticipated to begin starting about October 2008:
  - San Francisco County (54,610 acres);
  - San Mateo County areas including: Broadmoor, Brisbane, Colma, Daly City, Pacifica, San Bruno, and South San Francisco (included San Francisco County acreage above);
  - Alameda County areas including: Alameda, Albany, Berkeley, Emeryville, Oakland, and Piedmont (90,430 acres);
  - Contra Costa County areas including: El Cerrito, El Sobrante, Hercules, Kensington, Pinole, Richmond, and San Pablo (included in Alameda County acreage above); and,
  - Marin County areas including: Belvedere, Corte Madera, Larkspur, Sausalito, and Tiburon (16,420 acres).
- 3.4. After two life cycles of mating disruption applications without any LBAM detections, these applications will cease. Once the pheromone has dropped to levels that will not interfere with trap efficacy, post-treatment monitoring traps will remain in place for one additional life cycle. If no additional LBAM are detected, this area will be declared free from LBAM and trapping levels will return to detection levels.

#### 4. Trapping Actions:

The following trapping plan will be implemented by the Department and the USDA. The county agricultural commissioners will be informed of trapping actions in their respective counties.

- 4.1. Extension of detection trapping at a density of five traps per square mile into previously untrapped areas inside the regulated counties, such as rural and

industrial areas, will be implemented as needed.

- 4.2. Delimitation trapping arrays will be put in place where LBAM has been detected for those sites that are three miles from other detection sites at 100 traps per square mile in the core square mile and 25 traps per square mile in the adjacent eight square miles.
- 4.3. An additional detection within any delimitation area and within three miles and one life cycle will trigger an eradication project.
- 4.4. Traps in eradication areas will be stationary, placed at nine traps per square mile, inspected weekly, and baited with 3 milligram lure.
- 4.5. Mass trapping will be discontinued per the recommendation of the technical working group.

5. Environmental Monitoring:

Aerial pheromone applications will be monitored for quality control. The program will consult with DPR.

6. Environmental Consultations:

- 6.1. The program will provide OEHHA with information concerning the pesticides to be used in the eradication of LBAM for their use in any public outreach activities, educating physicians and tracking/evaluating illness complaints in the eradication areas.
- 6.3. The program will consult with any other appropriate governmental agencies concerning threatened and endangered species and sensitive environmental sites and it will obtain all of the required permits.

7. Public Health Concerns:

- 7.1 Prior to treatments, OEHHA will work with local health officers to ensure that physicians and other health care providers are provided with information on the application; what, if any, symptoms are likely to be seen; reporting requirements and direction on other concerns. In general, the physicians and health care providers will be informed of the illness reporting requirements and will receive training on pesticide poisoning recognition and management.
- 7.2 OEHHA will team with other public health organizations to develop and oversee a program for the reporting, tracking and scientific evaluation of reported illness incidents.

8. Regulatory Activities:

All federal and state quarantine orders and regulations will remain in place for the duration of this program.

9. Communications:

- 9.1. The program, county agricultural commissioners and, as appropriate, OEHHA, will conduct outreach to elected officials and other interested parties prior to the start of treatment activities.
- 9.2. Informational open houses and/or public meetings will be held in each county where eradication activities occur, as needed. Residents whose property will be treated will receive written notification prior to treatment.
- 9.3. Residents may sign up for an e-mail notification for updates on the treatment schedules and areas scheduled to be treated or call an informational phone line to have questions answered.
- 9.4. The Department's website will be updated with any pertinent information following each male moth attractant treatment and aerial mating disruption application.
- 9.5. Additional project information will be available on the website. Press releases will be issued for new events.



# What are CheckMate OLR-F and CheckMate LBAM-F?

*Questions and answers from the CDFA and the maker of CheckMate explaining how CheckMate works and precautions that must be taken to minimize contact.*

# What are CheckMate®OLR-F and CheckMate®LBAM-F?

## Questions and Answers

### *What are CheckMate®OLR-F and CheckMate®LBAM-F?*

CheckMate®OLR-F and CheckMate®LBAM-F are USEPA and Cal DPR registered formulations of the pheromone needed to disrupt LBAM mating for long-term eradication. This pheromone confuses the male LBAM, impairing his ability to find a mate. Once the breeding cycle of the moth population is disrupted, the infestation will eventually be eradicated from the area.

### *How do CheckMate®OLR-F and CheckMate®LBAM-F Work?*

Mating disruption involves applying very low amounts of the female pheromone. Because of the distribution of pheromone, the male moth cannot follow the female's pheromone trail, and therefore the moths do not mate, eggs are not fertilized and the mating cycle is disrupted.

### *Are there any known side effects?*

There are no known side effects. The pheromone has been approved and registered for use after an extensive review of the formulated product. There have been no reported adverse health effects on people or pets from the product. Because the pheromone is specific to LBAM it will not affect humans, other beneficial insects, animals, plants or vegetable gardens.

### *Will it kill other animals or insects?*

Because the pheromone is specific to LBAM it will not affect or kill animals or other beneficial insects. Pheromones only disrupt the communication between adult male and female moths. They do not have a toxic effect on the target species or any other species including animals, birds or other insect species and does not even kill LBAM.

### *Why use CheckMate®OLR-F and CheckMate®LBAM-F?*

The pheromone is effective as a treatment for LBAM and a proven integrated pest management method that could reduce the need for insecticides.

### PRECAUTIONS

Insect pheromones are extensively used today as a safe and effective means of mating disruption. These products have been used for 30 years with no known side effects. CheckMate®OLR-F and CheckMate®LBAM-F are two mating disruption products that are planned for aerial applications.

These planned aerial applications will be made at night to minimize inconvenience to the public in your area. However, people are cautioned to prudently avoid unnecessary exposure.

To minimize contact with the product:


- ✓ *Remain indoors* if possible while applications are in progress.
- ✓ There are no specific re-entry restrictions following application of these products when applied to your property.
- ✓ Do not leave *laundry* outdoors while applications occur. If left out, re-rinsing or re-washing, while not necessary, can be considered.
- ✓ CheckMate®OLR-F and CheckMate®LBAM-F have no history of harming and are not known to harm outdoor articles. If you wish to avoid contact, you may tarp them or remove them from the outdoors. *After application*, you may wash down outdoor eating areas, playground equipment, vehicles and objects such as toys and pet food dishes that may have been left out during application.
- ✓ There are no pre-harvest restrictions or intervals with these products. However, we always recommend you rinse all fresh fruits and vegetables with water before cooking or eating them, regardless of when harvested.

People who become ill should consult their physician; regardless of what they believe may be causing their symptoms.

### *Who do I call for questions?*

Contact the CDFA LBAM Website at [http://www.cdfa.ca.gov/phpps/pdep/lbam\\_main.htm](http://www.cdfa.ca.gov/phpps/pdep/lbam_main.htm) the CDFA Pest Hotline at (800) 491-1899, or Suterra LLC at 1-866-326-6737.

\* Information Source: Suterra LLC



# Comments on Public and Environmental Perspective on California Department of Food & Agriculture (CDFA) Light Brown Apple Moth (LBAM) Eradication Program

April 29, 2008

*City of Albany's Integrated Pest Management Task Force's  
summary of the opposition argument to LBAM.*

*Prepared by Nat Wishner, Chair of the Task Force.*

## **Comments on Public and Environmental Perspective on California Department of Food & Agriculture (CDFA) Light Brown Apple Moth (LBAM) Eradication Program**

Nan Wishner, Chair, City of Albany Integrated Pest Management Task Force

prepared for the California State Assembly Committee on Agriculture

March 12, 2008

### Summary

The general public and environmental perception is that the State has not proven that the Light Brown Apple Moth (LBAM) eradication program is safe, effective, or necessary. In the absence of solid science from the State, the burden of research and proof has been shifted to the public.

### Background

Aerial spraying is the most controversial element of the LBAM eradication program. Pesticides are sprayed from planes flying at 500-800 feet through the night, typically for three nights per month. Spraying is planned to take place approximately 3 nights per month, 9 months per year. CDFA plans to spray for 3-5 years or indefinitely until the moth is eradicated. The 2008 CDFA spray zone map ([http://www.cdffa.ca.gov/phpps/PDEP/lbam/lbam\\_main.html](http://www.cdffa.ca.gov/phpps/PDEP/lbam/lbam_main.html)) covers a number of counties and urban areas with a total population of about 7 million people. Ground treatments are also planned for 2008. The public is concerned about the chemicals and methods to be employed in this part of the program, particularly the entry of CDFA representatives to private property.

### Safety

Concerns about the safety of the aerial spray program revolve around the lack of testing of key ingredients in the pesticides being used, known dangers of other components of the pesticide, health complaints reported by residents of the Monterey and Santa Cruz areas after spraying there last year, and the potential that CDFA may use a different and untested chemical in the 2008 spray program.

### *Pesticide used in 2007*

The active ingredient in the pesticide products that CDFA used in 2007 is a synthetic moth pheromone. The two pesticides used in fall 2007, Checkmate OLR-F and Checkmate LBAM-F, also contain a number of toxic, potentially carcinogenic, mutagenic so-called "inert"<sup>1</sup> ingredients, one of which is a reproductive effector associated with birth defects, and several of which should not be inhaled. This information is readily available on the Material Safety Data Sheets for the ingredients and in the National Institute of Occupational Safety and Health database.

The pesticide mixture is packaged in minute plastic capsules that are inhaled by anyone exposed to the spray. These capsules are as small as 10 microns in size, according to a U.C. Davis study released last year (Werner et al. 2007). The American Lung Association, among other sources, notes that particles of 10 microns and smaller can be inhaled into the deep lung, from which they cannot be expelled. The plastic capsules in which the pesticide is sprayed break down over approximately 30 days, releasing the pesticides. Recent information from OEHHA indicates that the spray particles may remain suspended in the environment for up to 12 months.

The only ingredients in the pesticide that have been thoroughly tested are the inerts. The active ingredient, the synthetic pheromone, has not undergone any long-term human toxicity testing, as noted in court testimony and analysis by independent toxicologist Dr. Richard Philp. Moreover, the State's Consensus document on the health risk of the spray, prepared by the Department of Pesticide Regulation (DPR) and the Office of Environmental Health and Hazard Assessment (OEHHA), contains the explicit disclaimer that the conclusion that the spray is safe for human exposure is based studies of the active ingredient only, and that these studies assume "aerial application over agricultural areas rather than aerial application over

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<sup>1</sup> Inert ingredients are so named because they do not actively work to kill the target pest. In most cases, the U.S. Environmental Protection Agency tests only the active ingredient of a pesticide, not the complete formula including inerts, and the inerts are usually considered proprietary business information and are not disclosed. For Checkmate LBAM-F only, the inert ingredients disclosed after the first round of LBAM spraying in 2007.

populated areas (such as in the present situation)."

CDFA obtained an exemption from U.S. EPA to use the products in this manner and warns people and pets to stay inside during the spraying. Checkmate had not been sprayed over urban areas until CDFA used it over Monterey and Santa Cruz last fall; it had previously been sprayed aerially only over agricultural areas.

#### *Health Complaints*

Following the spraying in Monterey and Santa Cruz in 2007, there were more than 600 reports of health problems, including asthma-like attacks and difficulty breathing, chest pains, headaches, blurred vision, swollen glands, skin rashes, and feelings of chronic fatigue. These symptoms are consistent with the health impacts of the ingredients of the pesticide formula whose effects are known. The State's Consensus document on Health Risks says that "it is not possible to confirm the symptoms are or are not due to the application of Checkmate," and "because not all health effects can be predicted and because the general population includes susceptible populations, such as children, the elderly, and those with chronic diseases, we cannot provide a definitive cause for their symptoms." These health complaints were reported despite the absence of an infrastructure to collect them and the failure to notify and train physicians regarding the spray and the symptoms of pesticide exposure. These complaints have not been formally and thoroughly investigated by the State, and CDFA's Robert Dowell has publicly dismissed the complaints, stating that they are likely imaginary.

There is public concern that CDFA is exploring using a new pesticide that is currently being investigated but not tested for human health and environmental safety. Given the risks of the pesticide used last fall and the health problems reported, the potential that another unknown and untested product will be used over large populated areas is disturbing at best.

#### *Are Pheromone Controls Environmentally Preferable?*

CDFA stresses that pheromone-based products are one of the safest eradication tools available and that environmentalists "want" pheromone pest controls. While many environmental and organic agriculture groups have advocated the use of pheromones, the formulation and encapsulation in plastic of the products being used in this case, the lack of testing of human exposure, and their aerial application differentiate them from environmentally preferable pheromone products such as stationary bait traps. The recent position statement released by California Certified Organic Farmers (CCOF) expresses concisely the view of many environmental and health groups: "CCOF supports the use of pheromones in ground applications and other ecologically sound organic integrated pest management (IPM) approaches as far preferable to the use of dangerous organophosphates. However, CCOF does not endorse further aerial applications of pheromones in LBAM eradication efforts due to potential human health and environmental concerns."

#### Effectiveness

Aerial pheromone spraying has never been used to and cannot successfully eradicate a pest because the spray only confuses mating behavior and does not kill pests.

In addition, the conditions necessary for successful use of a pheromone cannot be met by the varied terrain, plantings, and moth concentration in the large area CDFA proposes to spray. According to a report recently released by botanist and Executive Director of the UC Santa Cruz arboretum Dr. Daniel Harder on integrated pest management (IPM) for LBAM in New Zealand, pheromone coverage is only effective under the following conditions:

- Extensive, even, and complete coverage of the pheromone
- Uniform blocks of a single crop (single canopy height)
- Uniform topography (no slopes, hills or valleys)
- Low population density of target pest (not too concentrated)

There is also the larger question of what is meant by "eradication." According to a list provided by CDFA, the agency undertaken 274 separate emergency eradication projects against 9 pests since 1982, with projects repeating annually for the same pests. In every case, CDFA has failed to eradicate the

target pest, and emergency eradication programs for 6 of these pests have been in process since 1982. This cycle of continual pesticide use is the basis for positions like the Sierra Club's opposing the LBAM eradication. The Sierra Club resolution, passed in January 2008, specifically calls on the state to take the "precautionary approach of an alternatives assessment to determine control strategies that do not compromise human and environmental health and that is sufficiently effective to manage the pest to the acceptable thresholds is completed. The assessment must be based on a realistic assessment of the feasibility of eradication." It is increasingly clear to environmental and health organizations that, in this era of global trade and global warming, the arrival exotic pests is inevitable and likely to increase. We cannot blanket spray for each new pest that is introduced or re-introduced.

### Necessity

CDFA has stated that there has been no damage to crops in California attributable to LBAM. Independent scientists, including Dr. James Carey, UC Davis entomologist and invasive species specialist, say that, based on the range over which it has been found, LBAM has likely been in the state for up to 30-50 years, which is certainly long enough for us to have seen crop damage. A report recently released by Dr. Daniel Harder, botanist and Executive Director of the UC Santa Cruz arboretum, finds that, in New Zealand, LBAM is effectively controlled by native predators of the same types that are present in California.

### *Native Predators*

A Dr. Harder's report finds that, in New Zealand, which has climate and crops like those of California's coastal areas and where LBAM has been an established exotic pest for more than 100 years, there is no evidence of biological or environmental threat from LBAM. LBAM does not do significant economic or biological damage to crops or native flora there. The report also notes that 80-90% of LBAM larvae are parasitized by native predators in New Zealand. The same "generalist" native predators, including birds, spiders, specific types of wasps, and others, are found in California, which is currently home to more than 85 native and localized species of Tortricid moths similar to LBAM (none of which is the subject of an eradication program).

### *Potential Crop Damage*

With regard to potential crop damage, CDFA's list of 2,000 potential host species for LBAM is speculative and exaggerated. The list includes species that LBAM, which is a leaf-roller moth (i.e., it requires leaves to wrap around the larvae to protect them), would not likely inhabit, such as redwoods and pines. And the list includes any plant on which LBAM has ever been seen, whether or not it fed on that plant. CDFA says that the criterion for LBAM's inclusion on the list is that it is "capable of being eaten by LBAM," according to Steve Lyle.

In hearing reports of LBAM crop damage from Australia and New Zealand, it is important to note when the damage occurred. LBAM has been a problem past in the past when broad-spectrum organophosphate pesticides were in wide use and had destroyed the populations of beneficial predator insects that attack LBAM. A frequently cited report of LBAM-damaged grapes was a single incident in the early 1990s when organophosphates were heavily used. Since 2001, when organophosphate use was abandoned in New Zealand and beneficial insect populations have rebounded, LBAM is no longer a problem pest there, according to Dr. Harder's report.

### *Risk to Central Valley*

Some have expressed the concern that LBAM will be very destructive if it reaches California's Central Valley. However, LBAM does not reproduce well below 7.1 degrees C (45 degrees F) and or above 30.7 degrees C (87 degrees F) (Venette et al. 2003), so it is unlikely to establish in the Central valley or in "80 percent of the U.S." as CDFA staff predicts.

### *Risk of Increased Pesticide Use if Aerial Spray is Not Employed*

The argument presented by CDFA that, in the absence of spraying, California residents will irresponsibly begin a "never ending" cycle of pesticide use is highly unlikely.

First, LBAM does not do serious damage. While some photos have been shown by CDFA and the press of LBAM damage that may look frightening, there is no information about the source of the damaged fruit; how old are the photos and where do they come from? how widespread was the damage? were the

growers using best management practices? were the plants inoculated with LBAM as part of study, or is the damage a result of LBAM's natural presence and behavior? were organophosphate pesticides being used and what was the state of the population of natural LBAM predators? New Zealand scientists report that LBAM is a superficial feeder that does primarily cosmetic damage to the surface of fruit and only nibbles at leaves. It would not be in LBAM's interest to defoliate a tree or completely consume the leaves that protect it.

Second, as part of the preparation of Albany's Integrated Pest Management ordinance, our Task Force last year surveyed residents' pesticide use and found that 60% use only organic pest control methods (California Certified Organic Farmers earlier this week came out in opposition to the aerial spray program). It seems unlikely that residents of environmentally conscious California would suddenly begin freely using pesticides to combat a moth that does little or no damage.

#### *Trade and Quarantines*

Finally, with regard to economics and trade, the numerical values of *potential* crop damage from LBAM that CDFA cites appear inflated based on information regarding costs to meet the U.S. Department of Agriculture's zero-tolerance LBAM quarantine, not on values of crops damaged in Australia or New Zealand. The concern that Mexico and Canada will reject produce if LBAM is not eradicated seems overblown given that Canada adopted its LBAM restrictions following the U.S.'s lead, and Mexico's LBAM quarantine advisory of May 2007 notes "the present phytosanitary conditions may be modified or harmonized whenever we have more technical and scientific information regarding *E. postvittana*, as well as we receive more information about the evolution status of this pest in the United States."

#### What Should We Do?

If LBAM has indeed been in California for decades and there is no evidence of damage, the likely conclusion is that it is being kept in check by natural predation. Sound integrated pest management (IPM) practices dictate that the first step in responding to any potential pest is to monitor to determine the degree of damage and assess whether any action is needed and what a reasonable threshold for action should be. There certainly appear to be no grounds for emergency action against LBAM.

As Dr. Harder's report suggests, no intervention for LBAM may be necessary. We should suspend the LBAM eradication program and monitor to determine the extent of natural parasitization of LBAM. If monitoring data show that some LBAM control is necessary, we should follow the IPM best practices New Zealand has found to be effective, using insect growth regulators (IGRs), which are least-toxic chemical controls, at specific problem sites.

Consistent with IPM best practices, we should stop use of organophosphate pesticides for LBAM in nurseries to protect the beneficial predators of LBAM and other pests as well as workers, consumers, and the environment.

We should ensure that this and other invasive species eradication programs are subject to a broad range independent scientific review, and that no population, urban or rural, is subjected to pesticide spray without consent.

In view of the background research Dr. Harder has performed, we should request that the U.S. Department of Agriculture re-evaluate the classification of LBAM based on up-to-date science.

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# Invasion Biology of the Light Brown Apple Moth

March 12, 2008

*Dr. James Carey's testimony before the California State Legislature. Dr. Carey challenges the science behind the eradication strategy and recommends alternatives.*

*Carey is an entomologist at UC Davis specializing in invasion biology, insect demography, and population dynamics. He also served on CDFA medfly scientific advisory panel from 1987 to 1994.*

# **Invasion Biology of the Light Brown Apple Moth**

James R. Carey (UC Davis)

Presentation to Assembly California Legislature

**Committee on Agriculture**

*Room 4202 State Capital*

*March 12, 2008*

Thank Madam Chair for inviting me to testify to this committee.

I am James Carey, entomologist at UC Davis with specialties in invasion biology, insect demography, and population dynamics. I served on the CDFA medfly scientific advisory panel from 1987 to 1994 and also testified on the medfly crisis in the state to the California Legislature Committee of the Whole 17 years ago.

The question regarding the LBAM invasion is not whether we want it eradicated—of course we do. Rather the question is whether it is possible to actually eradicate it.

Although I am not speaking for anyone other than myself, I have talked to eight different UC entomologists about the LBAM problem. Some of these are highly statured scientists within the UC System. Not one of these entomologists believes that the light brown apple moth can be eradicated. Nor do any of them believe that this is a recent invader. *Not one.* But none of these entomologists is willing to speak out because either of fear of retribution from the agencies and/or industry with regard to their research support or out of a feeling that supporting eradication efforts (even if blindly) shows their allegiance to agriculture mission. But given the extent of the LBAM infestation and the lack of control tools, I seriously doubt that there is any entomologist in the country who truly believes that eradicating this pest is possible at this stage.

I would like to first offer my scientific views of the LBAM problem and then make specific suggestions for actionable steps for both the short and long term.

The current distribution of the Light Brown Apple Moth (LBAM) in California, covering 10 counties with a combined area of more than 8,000 to 10,000 square miles (i.e., the size of Connecticut) suggests that this pest is not a recent introduction but has been in the state for many years, perhaps 30 to 50 years or longer. For perspective, the gypsy moth took more than 10 years to spread from the point of introduction in an amateur naturalist's back yard to his neighbor's yard, and over 30 more years to spread to three counties in Massachusetts. The argument that LBAM is a recent invader because no populations were detected by the CDFA in 2005 cannot be reconciled with LBAM's current widespread distribution. This recent invader argument is simply not credible. For the "recent invader" argument to be valid, the assumption would have to be made that the pest is capable of spreading 4,000 to 8,000 square miles annually or, alternatively, from 50 to 100 miles outward per year. However, there is no precedent for this rate of spread for any insect. Not even close.

Likewise the model of LBAM population growth contained in the declaration by CDFA that was signed October 31, 2007 by Dr. Kevin Hoffman not just lacks credibility, it is demographically incredulous. As the author of three books on demography including one on insect demography that is considered by many entomologists in the country as the go-to book for demography, as well as the associate editor of several scientific journals including one on demography, the population growth model presented by CDFA would not be taken seriously by any editor of any entomology or ecology journal in the world. The CDFA model has LBAM growing at a demographic speed of light with one moth producing two thousand trillion moths in 5 generations. This is the equivalent of 50 moths per square inch in Berkeley. As a demographer using actual per generation growth rates of LBAM published in one of the most elite ecology journal in the world (*J. Anim. Ecol.*), my estimates for population growth would not be two thousand trillion moths but from 50 to 100 moths.

The history of eradication programs in which an exotic insect is as widespread as LBAM is in

California suggests that we have little if any chance of success because several key preconditions for conducting a successful eradication program are unmet. These include having:

1. An effective eradication tool. Mating disruption pheromone is a “control” tool and not an eradication tool. There are huge problems even with the use as a control tool. Never in the history of insect eradication has a pheromone ever been used for any eradication program, much less been successful in eradicating any insect population.
2. A monitoring system for delineating the full extent of the infestation at the beginning of the program as well as for identifying small populations in scattered pockets at advanced stages.
3. Strong public support so that ground crews deploying controls can have full access to private property over a sustained period.

Even under the best of circumstances eradication is difficult to achieve for the same reason that cases of advanced metastatic cancer are difficult to cure. That is, there is not one LBAM population but tens of thousands of populations infesting backyards, parks, fields and roadsides. Thus anything short of 100% effectiveness for each of these population pockets must be considered “control” and not “eradication” This because any of a number of residual pockets of LBAM can regenerate the original populations spread over a wide area.

### **Recommendations:**

1. Do a reality check. This pest is so widespread, the control and monitoring tools so ineffective, and public support in urban areas so weak (if not hostile) that eradication is simply not an option. The US Forest Service tried to use DDT in the 1960s to eradicate the gypsy moth spread over an area not much larger than the area occupied by LBAM in California. The program failed, not because of lack of effort but because eradication is so incredibly difficult when pests are widespread, even with effective control tools.
2. Stop considering exotic pest situations as dichotomous—either eradicate or manage. In fact, there are any number of intermediate concepts including containment. Thus we should be considering creating a first rate program of containment of the LBAM rather than launching an eradication program that has no chance of success. Model after the ‘slow the spread’ program against the gypsy moth on the east coast and Midwest. Explore the concept of ‘moth free zones’ similar to what is used for fruit flies whereby if moths not captured in region with accepted monitoring protocols, then considered risk free and can ship commodities.
3. Revisit trade policy. Right now the biologists and entomologists at CDFA and USDA have to shoulder the lion’s share of the burden for dealing with pests. However, just as some mountains cannot be moved and some cancers cannot be cured, many pests simply cannot be eradicated. Thus need to consider more realistic trade policy consider non-zero risk. It is in the interest of all trading partners since really comes down to an agreement of risk between a buyer and a seller. The same group who is buying today is selling tomorrow and they too may have to deal with reciprocal quarantines if they demand zero risk at every turn.
4. Get University of California involved. UC is the research arm of our state yet the only input UC writ large has to invasive pests is after the fact and picking up the pieces. To have token UC scientists on each panel amounts to little because there can be little independent thought on these panels. Everyone knows that the panel has its marching orders and, because these are technical advisory panels, the input is technical and not strategic. There are 150 ecologists just at UC Davis alone. There are probably 1,000 ecologists across UC system, many of whom are NAS members and elite scientists. This braintrust can be tapped and engaged in helping to deal with exotic pest problems from agriculture and forestry to marine and freshwater systems. UC involvement would provide a much-needed degree of scientific input that is independent and objective and in an early stage of decision making (e.g. before the decision

to launch an eradication program).

5. Help create discipline of ‘invasion science’. I consider invasion biology at the same stage now as what conservation biology was 30 years ago—mostly anecdotes and protocol-driven policy rather than policy based on a set of unifying principles. For example, fisheries and wildlife used to be mostly case-studies. Now it has evolved into a more coherent science of conservation biology where many of the same principles for protecting endangered butterflies also apply to endangered elephants. Likewise, right now forest entomologists do not even communicate with crop entomologists about eradication concepts. What needs to evolve and where California can take the lead is to in taking steps for developing a coherent discipline of invasion science where the invasion biology, the monitoring, the trade policies and risk, and exclusion concepts, and intervention tactics are brought together into a more cohesive whole.

In closing, I will note that because I disengaged from invasion biology research and panel membership over 10 years ago, I can see this LBAM problems with both fresh eyes as well as from the perspective of having served on the CDFA medfly panel for 7-8 years. Broadly speaking, virtually nothing has changed operationally since I joined a panel in 1987. The only things that have changed is that emergencies are more frequent and pests the state has been dealing with for 20 or more years are more entrenched and widespread. It is clearly a time to take a hard look at our approach to exotic pests in the state and consider changing the way we do business.

Thank you.



# Dr. Derrell L. Chambers Testimony to Senate Environmental Quality Committee

April 28, 2008

*Retired USDA pheromone and pesticide expert testifies that the LBAM pheromone based eradication effort is misguided and will not succeed.*

*Chambers has a PhD in insect physiology and worked for the Agriculture Research Service of the USDA for 40 years. His work included specific research on insect pheromones and technologies to manage and eradicate pests.*

Derrell L. Chambers  
Testimony to Senate Environmental Quality Committee  
re: Bill Number SCR 87 – “Relative to the Light Brown Apple Moth”.

April 28, 2008

Good afternoon, and thank you for this opportunity to testify.

I am Derrell Chambers and my intent today is to bring to this matter my experience in the development of insect pheromones in pest management. I retired from the U. S. Department of Agriculture in 1994 after nearly 40 years largely devoted to developing pheromones and hormones as they emerged as new opportunities to avoid the use of pesticides. I obtained a Ph. d. in 1965 in insect physiology precisely to prepare for this new area of research. Thereafter, I returned to the Agricultural Research Service of the USDA and specialized in conducting and directing pheromone development until my retirement. I was the Laboratory Director of ARS research in Mexico and Hawaii concentrating on the technologies now in use in California and elsewhere to manage and eradicate pests such as the Mediterranean fruit fly and the Mexican Fruit Fly. In 1968 I became Director of a new ARS facility in Gainesville, Florida, created specifically to conduct research on insect pheromones and hormones. During the following 12 years I was intimately involved in the conceptual and technical development of pheromones in agriculture. I then returned to field research in Guatemala, using its existence there as an opportunity to model such methods on large wild populations. I retired after 11 years in Guatemala.

In the nineteen seventies the medfly emergency in San Jose brought me there to serve as a science advisor to CDFA and I continued this service until well after my retirement. I hold the staff and management of CDFA’s pest control activities in the highest regard, and feel that with them I have contributed to California’s ability to address it’s emergency projects. I am fully in favor of eradicating emergent pest populations in California where it is necessary and feasible. Nevertheless, I do not support the aerial application of pheromone to attempt eradication of LBAM .

There are a number of ways pheromones are used to deal with pest insects. They are one of the best alternatives to reduce or avoid pesticide use. That said, no eradication of a pest species with only mating disruption has ever been accomplished. An attempt to eradicate the gypsy moth was the only regional, stand-alone mating disruption eradication yet attempted that I am aware of. That attempt has been reduced to its application in suppressing populations and delaying the pest’s spread. All other applications are for suppression only, and are accompanied by multiple, supporting integrated tactics.

In fact, the recommendation to CDFA by the advisory Working Group on LBAM specifically states, “ in addition to mating disruption, the program should consider using a multi-pronged integrated approach”, and then lists tactics to be included. If, indeed, CDFA intends an integrated attack on LBAM, why is this not apparent to the public?

But, if eradication with mating disruption alone is the true intention, I think it unlikely ever to succeed. Even so, such an attempt should be preceded by extensive trials to develop, improve and demonstrate efficacy. Eradication is extremely difficult and I think it unlikely to succeed in California without methods development and proof tests on an island population, even using multiple tactics. This has not been done for LBAM, not by ARS, APHIS, CDFA or even those most in a position to do so, the scientists of the various New Zealand agencies responsible for LBAM management in that country. The only field trial of mating disruption alone for eradicating LBAM was conducted recently in Santa Cruz County

We learned in San Jose that justification, appropriate technology, safety and proven efficacy must be convincing. Certainly, the public’s present feeling that they are being subjected to an unwarranted, unsafe, and untested procedure should be more thoroughly addressed than it so far has been. I believe the LBAM project should be challenged on all these issues, but I am particularly concerned that the issue of efficacy has not been sufficiently questioned.

I hope to convince you today that I am qualified to consider the principles of pheromone uses, the strategies for their employment, the tactics for their successful use and the complexities of the planning and management of large-scale eradication campaigns. It is my judgment that:

1. Mating disruption alone is not appropriate for California’s situation, and probably never will be.
2. Mating disruption for eradication of LBAM, even with the recommended supporting tactics is unlikely, and certainly has not been adequately tested, and
3. The political and social sensitivities of an unconvincing project are not being adequately addressed.

Thank you for your attention. I would be pleased to attempt to answer any questions you may have.

Derrell L. Chambers



# Marin Pesticide Spraying Health Hazard Alert

*Dr. Lawrence Rose of UCSF explains the short and long term health hazards of CheckMate's toxins and microscopic polyurea plastic capsules.*

*Rose has an M.D. and an M.P.H. and is the former Senior Public Medical Officer for Cal-OSHA. He works at UCSF in the Occupational/Environmental Medicine Department.*

## **Marin Pesticide Spraying Health Hazard Alert**

*By Lawrence Rose M.D., M.P.H., former Senior Public Medical Officer for Cal-OSHA and part of the UCSF Occupational/Environmental Medicine Department*

California Department of Food and Agriculture plans to aerial spray a micro-encapsulated pesticide to "eradicate" the Light Brown Apple Moth" (LBAM). The proposed pesticides — "Checkmate LBAM-F or Checkmate ORL-F" — contain a moth synthetic chemical pheromone combined with eight other chemicals in a plastic polyurea polymer capsule. These microscopic capsules ( 25 micron, and breaking down to under 10 micron) would be sprayed over heavily populated areas for 9 months of the year. In Marin they will begin in August 2008, concentrating for the present on San Rafael and south.

Capsules are designed to emit the pheromone over a 30 day period, to be repeated monthly (except winter) for continual saturation for several years. These airborne microscopic particles would drift down and randomly disperse, according to the prevailing winds, to settle on all exposed life, houses, gardens, playgrounds, walkways, etc., and of course be inhaled by all breathing life forms including homo sapiens. Any particle size under 10 micron would reach to the finest lung bronchiolar air exchange units called alveoli. These particles are designed to break down over a 30 day period when exposed; there is no data to know how they will act in human, dog, cat, etc., lungs.

The purpose of this science fact based information release is to inform health care providers so they can make an informed judgment as to what their professional responsibilities should be: and so the general population of Marin County can make an informed decision as to how to best protect themselves, families, friends, and communities, and environment from this unwarranted experimental toxic exposure.

There are many other demonstrated established effective methods for controlling the LBAM, and this factual information can be accessed at "Stop the Spray-Marin". So far there has been no demonstrable crop or plant damage in California from the LBAM.

### **Checkmate Toxicology**

Immediate short term acute health concerns are to be expected from the known toxicology of several of the chemicals in the Checkmate formulation mix and in the polyurea plastic particulate capsule.

Over 643 recorded health complaints were associated with the September, October, and November spraying in Monterey and Santa Clara Counties. These short term complaint symptoms are consistent with known toxicology scientific information of the ingredients of Checkmate (see attached document). These ingredients include irritants, sensitizers, nervous system disrupters, endocrine disruption, allergens, and hypersensitivity induction.

Long term health effects are also of concern due to the known induced mutations and suspected cancer risks of constituent chemicals.

It is also important to include the risks of the polyurea plastic capsules. Industrial production of this plastic uses isocyanate catalysts which can cause serious acute reactive bronchial constriction (asthma attacks) in exposed worker populations.

Glaring deficiencies in the animal toxicology studies are extremely important. There were no inhalation studies. There were no long term or multigenerational health studies done on this brew of toxic chemicals.

### **Population at Risk for Immediate Acute Reactions**

The panoply of symptoms that occurred in the 643 Monterey and Santa Cruz complainants included: asthma attacks, bronchitis, productive pulmonary congestion, shortness of breath, wheezing, coughing, chest pain and tightness, nasal congestion, sore throats, eye irritation, blurred vision, severe skin rashes, sinus bleeding that reflected acute upper respiratory distress, eye, and dermal reactions.

Cardiopulmonary reactions included arrhythmia, and tachycardia. More generalized acute debilitating systemic reactions included headaches, trouble concentrating, dizziness, muscle aches, tremors, gastrointestinal pain, diarrhea, lethargy, malaise, and fatigue. There were frank hormonal disturbances as evidenced by breast symptoms and menstrual irregularities.

Relevant medical histories, current medications, and most important timing in relationship to the spraying will give primary care practitioners the information needed to connect these patients to the pesticide exposure — if primary care practitioners receive and act on this information.

The population most at risk for acute reactions are asthmatics, infants, children, the elderly, patients with borderline cardiopulmonary compensation (e.g. chronic obstructive pulmonary disease, chronic bronchitis, pneumoconiosis, marginal pulmonary vital capacity), congestive heart failure, cardiovascular abnormalities, angina, those with environmental illness, and medically debilitated patients. It is critical that patients with such medical profiles be protected from these life-threatening to them airborne toxic particles.

### **Long Term Health Risks**

Major toxicity concerns go beyond immediate acute effects when the known toxicology profiles of the ingredients (attached) include endocrine disruption, mutagens, suspected carcinogens, and immune system disruptors. Such exposures could well put exposed population at increased risk for diseases later in life, e.g.: hormone disruption (multigenerational), genetic damage, reproductive disorders (spontaneous abortions, infertility, low birth weight newborns, birth defects), developmental disorders, cancers and leukemia, neurological disorders, and immune system dysfunction. Many diseases that fit into these categories are nationally increasing in frequency, and are probably

mainly due to toxic chemical environmental exposures.

Testing thus far by manufacturer and EPA of Checkmate is clearly inadequate to determine increased long term chronic health risks to the general population that would occur in these disease categories from airborne exposures.

### **Discussion and Conclusion**

It has been several months since Monterey and Santa Cruz counties have been sprayed. The federal DFA, state CDFA, and DPR have not implemented or funded a well designed epidemiology study to determine scope and seriousness of the health impact on exposed residents in these two counties. This is far beyond irresponsible, and in fact criminal negligence would be a more appropriate label for the lack of public health follow-up. The longer these necessary public health follow-up studies are delayed, the more critical information will be lost. Health questionnaires administered to all residents could determine the scope and seriousness of all short term and later long term adverse health reactions. Exposed residents should expect nothing less. Any acute reactions or disabilities resulting in medical expenses, disabilities, or loss of income from these exposures should be totally compensated. Federal and state agencies responsible for this spraying decision must take financial and criminal responsibility for adverse impacts to health and environment.

Physicians are legally required to report diagnosed pesticide diagnosis; but in the two sprayed counties there was no systematic notification that included probable short term health reactions sent to health providers, first responders, emergency rooms, or all residents before the September, October, and November 2007 sprayings. This is a shocking disregard of human rights in any democracy.

### **Further Information about LBAM**

Further information about controlling LBAM without spraying the general population can be accessed at the "Stop the Spray Marin website.

### **Further Broad Perspectives on the National Health Impact of Toxic Chemicals**

There are three recent studies of cumulative contamination of our bodies that give relevant information regarding public health impact of toxic chemicals we have all been exposed to — called "body burdens".

The CDC "Third Report on Human Exposure to Environmental Chemicals, 2005.(Access through Goggle)

The recent Environmental Working Group study of toxic chemicals found in fetal cord blood.

A number of studies showing the toxic chemicals found in maternal milk.

Most of the chemicals contaminating the nation's population through food, water, air, soil, and consumer products come from pesticides. Many exposures cannot be measured

in our bodies. There are a variety of other consumer products that are also causing these exposures. It turns out that recent studies of hormone disrupting chemicals show chemical health effects at extremely dilute low levels of exposure — down to parts per trillion in fetuses.

### **About the Author**

Lawrence Rose M.D., M.P.H., was the senior Public Medical Officer for Cal-OSHA for 28 years, and in that capacity was for a time assigned liaison for Cal-OSHA to the statewide interagency pesticide advisory committee, (recently retired), and an Occupational/Environmental Medicine practitioner, and part of the UCSF Occupational/Environmental Medicine Department.

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## **Checkmate Ingredients**

### **CheckMate/ LBAM-F Partial Ingredients Information**

This is based on ingredient information provided at <http://www.lbamspray.com/Health.html>; Additional information on CAS Numbers and synonyms is from [HYPERLINK "http://www.Chemfinder.com" www.Chemfinder.com](http://www.Chemfinder.com). Some of the additional information is from an article by entomologist Richard Fagerlund and sources need to be located.

#### **(E)-11-Tetradecen-1-yl Acetate**

**Pheromone component**

#### **(E,E) -9,11 Tetradecadien-1-yl Acetate, Crosslinked polyurea polymer**

**Pheromone component**

#### **Z isomer?**

The Z-isomer is a “behavioral antagonist” (Karg et al. 1997. J Insect Physiol 43(2):179-187, q.v., citing Rumbo et al 1993 J. Chem. Ecol.19: 953-961) It is also one of the components released from pheromone dispensers, (Karg et al. 1997, op.cit., citing Suckling et al 1994. J Econ Entomol 87:1477-1487).

#### **Butylated Hydroxytoluene, =2,6-Di-tert-Butyl-p-Cresol [128-37-0]**

Other Synonyms: 2,6-Bis(1,1-dimethylethyl)-4-methylphenol; 2,6-Di-tert-Butyl-1-Hydroxy-4-Methylbenzene; 2,6-Di-tert-Butyl-4-Methylphenol; 2,6-Di-tert-Butyl-p-Cresol; 3,5-Di-tert-Butyl-4-Hydroxytoluene; 4-Hydroxy-3,5-Di-tert-Butyltoluene; 4-Methyl-2,6-di-t-butyl-phenol; Annulex BHT; Antracine 8; BHT; Dibutylated Hydroxytoluene; Butylated hydroxytoluene; BUTYLATED HYDROXYTOLUENE CRYSTALLINE; Butylhydroxytoluene; Catalin CAO-3; Dalpac; DBPC; Embanox BHT; Hydagen DEO; Impruvol; Ionol CP; Sustane; Tenox BHT; Topanol; Topanol OC and O; Vianol;

**An antioxidant. Irritant; may be linked to asthma, mutations, cancer**

#### **Polyvinyl Alcohol [9002-89-5] (numerous synonyms)**

A component of white glue (or used to be).

**Irritant; may be linked to cancer in lab animals.**

**Tricaprylyl Methyl Ammonium Chloride = Capriquat [5137-55-3]**

Synonyms: Aliquat 336; Capriquat; Methyltricaprylyl ammonium chloride; Methyltrioctylammonium chloride; Tri-n-octylmethylammonium chloride; Tricaprylylmethylammonium chloride; Trioctyl methane ammonium chloride; Trioctylmethylammonium chloride;

**A phase transfer catalyst; used in mothproofing clothing; degrades to more toxic irritant**

**Sodium Phosphate = trisodium phosphate [7601-54-9]**

Synonyms: Phosphoric acid, trisodium salt; Sodium orthophosphate; Sodium phosphate; Sodium phosphate, ACS, 98.0-102.0% (Assay); Sodium phosphate, tribasic; Trisodium orthophosphate; trisodium phosphate;

**Irritant; can burn skin, eyes, and respiratory tract. Is associated with adverse effects when used in enemas.**

**Ammonium Phosphate [10124-31-9]**

Synonyms: Ammonium phosphate; phosphoric acid, ammonium salt;

**Used as a fire retardant and in fertilizers. Irritant; can burn skin, eyes, and respiratory tract**

**1,2-benzisothiazol-3-one- a misspelling for: 1,2-Benzisothiazolin-3-one [2634-33-5]**

Synonyms: 1,2-Benzisothiazol-3(2H)-one; 1,2-Benzisothiazolin-3-one; Benzisothiazol-3(2H)-one; Benzisothiazolin-3-one; IPX; Proxan; Proxel; Proxel XL; Proxil;

**Fungicide, bactericide. Highly toxic to green algae and marine invertebrates.**

**Sensitizer/allergen**

**2-hydroxy-4-n-octyloxybenzophenone =Methanone, [2-hydroxy-4-(octyloxy)phenyl]phenyl- [1843-05-6]**

Synonyms: 2-Hydroxy-4-n-octyloxybenzophenone; 2-Hydroxy-4-n-octyloxybenzophenone; 2'-Hydroxy-4'-n-octyloxybenzophenone; 2-Hydroxy-4-(octyloxy)benzophenone; Methanone, [2-hydroxy-4-(octyloxy)phenyl]phenyl-; Octabenzone;

**UV absorber; the benzophenone family of chemicals includes endocrine disruptors.**



# Dr. Robert Leavitt Letter to Drs. Dennis Knepp and Haferman

May 23, 2008

*Letter from the CDFA regarding the size and safety of Checkmate. States that the smallest capsules are 4.5 microns, less than the 10 micron threshold for penetration of deep lung tissue.*

*Robert Leavitt, Ph.D., is the Chief of the Integrated Pest Control Branch.*



CALIFORNIA DEPARTMENT OF  
FOOD & AGRICULTURE  
A. G. Kawamura, Secretary

May 23, 2008

Dr. Dennis Knepp  
P.O. Box 1014  
Monterey, CA 93942

Dr. Jeff Haferman  
P.O. Box 30  
Monterey, CA 93942

RE: Your letter dated May 14, 2008

Dear Drs. Knepp and Haferman:

Thank you for your response to my last letter of May 14. It indicates to me the need to reiterate one critical aspect; that is, almost 3/4 of the CheckMate LBAM-F product is water, and a **little** more than 1/5 consists of microcapsules. The microcapsules consist principally of liquid pheromones inside a polyurea shell. The following is a list of the contents of the product by weight:

Water, approximately 72%  
Pheromones, approximately 18%  
Polyurea, approximately 3%  
Other inert ingredients, approximately 7%

The microcapsules total approximately 21 percent of the formulation. This translates to about 18 grams of microcapsules per acre, as per my previous letter dated May 9.

According to the manufacturer, the microcapsules tend to adhere to surfaces they contact. This means that once settled out of the air, most of the microcapsules will be adhering to trees, shrubs, ground, etc. While it is possible that under certain environmental conditions (e.g., high wind velocity), some of the settled microcapsules could be resuspended, the resulting concentration of microcapsules in the air is likely to be much less than that during or immediately after the spray.

Inhalation exposure to the microcapsules is considered short-term. The microcapsules cannot remain in the air for 30 days. The smallest microcapsules in the CheckMate LBAM-F product are larger than 4.5 micron in diameter, because as discussed in the previous letter dated May 9, it would only take 1-2 hours for these microcapsules to settle out of the breathing zone. The larger particles settle even faster.



Drs. Dennis Knepp and Haferman

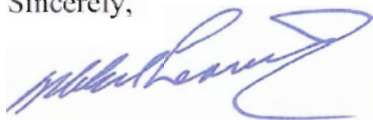
May 23, 2008

Page 2

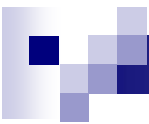
The pheromones are slowly released from the microcapsules into the air for approximately 30 days where they serve as attractants to the male moths, causing mating disruption.

I hope you find the above information useful. If you have any further questions or concerns, please do not hesitate to contact me.

Sincerely,



Robert Leavitt, Ph.D.  
Branch Chief



Letter from Dr. Elisa Song and Dr.  
Dawn Daniel to Governor Arnold  
Schwarzenegger and Secretary  
Kim Belshe  
May, 2008

*Letter from a pediatrician and a pulmonary and critical care doctor explaining the health concerns associated with the aerial spray of CheckMate as well as the elevated risk to children.*

*Elisa Song is a doctor of Pediatrics and Environmental Medicine in Belmont, CA. Dawn Daniel is a Pulmonary and Critical Care doctor in Marin County, CA.*

Governor Arnold Schwarzenegger  
State Capitol Building  
Sacramento CA 95814

Secretary Kim Belshé  
California Department of Health and Human Services  
1600 Ninth Street, Room 460  
Sacramento CA 95814

May, 2008

Dear Governor Schwarzenegger and Secretary Belshé:

We, the undersigned, are very concerned physicians writing to ask that you permanently stop aerial spraying for the light brown apple moth (LBAM) over populated areas and seek safer, more effective alternatives to address this and other invasive species.

We find compelling evidence that the human health risk posed by the LBAM aerial pesticide spraying program that began last fall is too great to warrant the program's continuation. Moreover, we are not reassured by the investigations and testing that the state has conducted and is currently conducting related to the spray program.

The risks posed by the spraying last fall are evident in: the 643 health complaints filed even in the absence of any formal and readily available information about how to file; the symptoms reported, which are consistent with the known effects of the ingredients of the pesticide used; and the exposure risks of any aerosolized application over vulnerable populations – our children, the elderly, those with respiratory and other chronic disease, and those with genetic mutations known as single nucleotide polymorphisms (SNPs), which alter their detoxification capacities. These SNPs increase an individual's susceptibility to even very low doses of environmental toxins and exposures. It is impossible to predict who will have trouble processing and eliminating toxins due to SNPs, but for this population, even very low doses of a purportedly innocuous chemical like Checkmate, the pesticide sprayed last fall, or the similar pesticides which will continue to be sprayed for LBAM, can have major health consequences.

Children are especially vulnerable to exposures to toxic substances which might otherwise be tolerable for adults. Children are exposed to more toxins than adults because, pound for pound, they drink more water, eat more food, and breathe more air. Children play on the ground where the aerially applied pesticide will persist during the period between sprays and they are much more likely to put their hands in their mouths without washing them first. Not only will children ingest more chemicals from Checkmate or other LBAM spraying, but they will absorb more of these toxins than adults through their more permeable intestinal linings, and more of these toxins will pass directly into their developing brains through their more permeable blood-brain barriers. Rapid growth and development makes children more vulnerable and biologically sensitive to toxic insults at lower levels of exposure, and briefer intervals of exposure. Children also have immature liver detoxification capacities, further compounding their vulnerability.

The documented rates of illness and verifiable contamination of individuals from pesticides and other similar environmental toxins are alarming and are associated with both short and long-term health consequences. Several illnesses can be linked to exposure to environmental toxins, including asthma, autoimmune illness, Parkinson's disease, hormonal disorders, learning disabilities, and autism. Checkmate has not been tested for its long-term neurological or neurodevelopmental effects. And we have no idea how each of Checkmate's ingredients interact with each other, or how Checkmate interacts synergistically overall with all of our other environmental exposures. And there is no reason to believe that any new pesticide selected for use this year in the LBAM program would be any more thoroughly tested or characterized than Checkmate has been. A study released in 2006 found that children with autism in the San Francisco Bay Area were twice as likely to be born in areas with higher estimated levels

of toxic air pollutants. The Collaborative on Health and the Environment released a Scientific Consensus Statement: “The scientific evidence we have reviewed indicates environmental contaminants are an important cause of learning and developmental disabilities [LDDs]. The proportion of environmentally induced LDDs is a question of profound human, scientific and public policy significance. Existing animal and human data suggest that a greater proportion is environmentally influenced than has yet been generally realized or than can be demonstrated with scientific certainty... Despite some uncertainty, there is sufficient knowledge to take preventive action to reduce fetal and childhood exposures to environmental contaminants. Given the serious consequences... a precautionary approach is warranted to protect the most vulnerable of our society.”

The rates of chronic illnesses in children are disturbingly on the rise. We know children became sick following the LBAM spraying last fall, including one 12-month-old boy who nearly died from respiratory arrest and experienced a subsequent attack of reactive airway disease weeks later. He is now on chronic asthma medications and may have asthma for the rest of his life. That boy was fortunate to receive prompt, excellent medical care, but children who are uninsured or underinsured in the poorest areas in our cities may not be so lucky. The proposed spray zones in many counties correspond with the highest rates of childhood asthma hospitalizations.

The pesticide spray used last year poses particular risks because of the lack of long-term testing of the active ingredient (the synthetic pheromone), the known risks of some of the inert ingredients (including links to cancer, cell mutation, birth defects, miscarriages), and the inhalation risks of the polyurea microcapsules. Recent information suggests that the percentage of the pesticide mist made up of capsules 10 microns or smaller is greater than previously stated. Particles 10 microns and smaller pose a special risk as they can penetrate deep into lung passageways and cannot be expelled – they can only break down, enter the bloodstream, and/or cause scarring. The plan to spray repeatedly for a number of years increases the risks to the population not only because exposure to these chemicals will be ongoing but we know that sensitivity of lung tissue can greatly increase with repeated exposure to an irritant. Children, the elderly, and the chronically ill are especially at risk because their lungs are already more reactive to particulate matter.

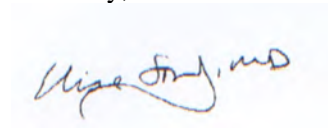
Some will argue that the amounts of pesticide applied are too small to pose a health risk. However, our understanding of what constitutes a safe threshold has evolved over time for many chemicals and we now know that smaller and smaller amounts of toxic substances can cause harm. For example, in 1960, a blood lead level of 60µg/dl was considered safe; now we know that 10 µg/dl can cause harm and that even levels as low as 5 ug/dl can be harmful for some. And as mentioned before, people who have SNPs in their liver detoxification capacities can suffer negative health consequences from even minute toxic doses.

We find that the state’s investigation and testing related to the spray is inadequate to assess the true risks of the spray. The Department of Pesticide Regulation/Department of Public Health/Office of Environmental Health Hazard Assessment investigation published in April regarding the health complaints reported in Monterey and Santa Cruz last fall lacks any validity. The investigators examined only a small number of the reports after determining that most contained insufficient information. No attempt to obtain the missing information was made, nor were any individuals with health complaints or physicians who filed reports contacted. No objective data were collected to assess whether the period following the spray was characterized by, for example, an increase in illness, work or school absenteeism, or doctor and emergency room visits relative to normal rates in the area. The recent announcement that the as-yet undisclosed chemicals to be sprayed this summer will undergo “six-pack” acute toxicology testing is also not sufficient assurance of safety. These acute toxicology tests assess only very short-term and intense exposure. They do not assess repeated, ongoing exposure, which is what those living in the spray zones will experience. The tests also do not address many of the types of illnesses reported last fall, such as asthma, nor do they address long-term health effects such as cancer, birth defects, neurodevelopmental disorders, or genetic damage.

In addition to concerns about the inadequacy of safety testing and follow-up monitoring of those who reported illness following the spray last year, we are deeply concerned about what preparation and support will be provided to the medical institutions and practitioners in the spray zone who will have to treat and report those who fall ill should spraying proceed. We are also concerned about what kind of education and preparation will be offered to residents of the spray zone regarding symptoms and appropriate treatment. Spraying is currently set to begin in less than four months. When and how will practitioners be trained to recognize and address the symptoms from exposure to an as-yet undisclosed chemical, and who will do this training? What resources will be provided to ensure that sufficient staff and facilities are available to address a surge in illness rates following the spray? Our emergency departments are already overburdened, and the potential strain from an increase in illnesses from further spraying could be more than an overtaxed public health system can tolerate.

As medical doctors, our primary concern is the health and well-being of the children and adults in our communities. We believe the public and private health risks of the LBAM aerial spraying are too great to be ignored. If there is even a plausible risk to the health of our most vulnerable populations, then it is the responsibility of our elected officials to address that risk and use safer alternatives, which do exist. We urge you to permanently ban the LBAM aerial spraying over populated areas and protect the health of our communities.

Sincerely,

A handwritten signature in blue ink that reads "Elisa Song, MD". The signature is written in a cursive style and is positioned above the typed name of the sender.

Elisa Song, MD, Pediatrics & Environmental Medicine  
Belmont CA

Dawn Daniel, MD, Pulmonary and Critical Care  
Marin County CA



# Plant Industry Guidelines for Establishing or Changing Pest Ratings

April 28, 1989

*CDFA explanation of pest ratings and classifications.  
The LBAM has been classified as a Class A Pest.*



## PLANT INDUSTRY<sup>[3]</sup> GUIDELINES FOR ESTABLISHING OR CHANGING PEST RATINGS

### I. GENERAL PRINCIPLES

Section 403 of the California Food and Agricultural Code mandates that, “The department shall prevent the introduction and spread of injurious insect or animal pests, plant diseases, and noxious weeds.” This statutory duty requires a pest policy which recognizes that organisms vary as to their potential and actual harm to California’s agriculture and environment. Overall pest significance is the basis for determining what pest prevention activities are appropriate, at what level, and when and where those activities should be conducted.

- A. Pest ratings are intended as aids to inform county agricultural commissioners and other interested persons as to a particular pest’s environmental, agricultural and biological significance, as well as its importance to the general public, and the action recommended by the Department to deal with the pest.
- B. Each pest rating represents the Department’s view of the statewide importance of the pest to the agricultural, horticultural, forestry and public health interests of California. Local conditions may dictate more stringent action against the same pest in individual counties at the discretion of the county agricultural commissioner.
- C. It is the Department’s policy to use the “Action Oriented Rating System”. Pest ratings represent the Department’s policy governing what action is to be taken consistent with existing statutes which include authority for: the promulgation of quarantine, eradication, control, standards of cleanliness, and other regulations; holding and inspection; establishing host-free, weed-free, and special pest control districts; and for other regulatory activities.

### II. ACTION ORIENTED RATING SYSTEM

#### DEFINITIONS

- “A” An organism of known economic importance subject to state (or commissioner when acting as a state agent) enforced action involving: eradication, quarantine regulation, containment, rejection, or other holding action.
- “B” An organism of known economic importance subject to: eradication, containment, control or other holding action at the discretion of the individual county agricultural commissioner.

or

An organism of known economic importance subject to state endorsed holding action and eradication only when found in a nursery.

“C” An organism subject to no state enforced action outside of nurseries except to retard spread. At the discretion of the county agricultural commissioner.

or

An organism subject to no state enforced action except to provide for pest cleanliness in nurseries.

“Q” An organism or disorder requiring temporary “A” action pending determination of a permanent rating. The organism is suspected to be of economic importance but its status is uncertain because of incomplete identification or inadequate information.

In the case of an established infestation, at the discretion of the Director<sup>[1]</sup>, the Department may conduct surveys and may convene the Division Pest Study Team to determine a permanent rating.

“D” No action. (Parasites, predators, and organisms of little or no economic importance).

### III. PROCEDURE FOR ESTABLISHING NEW RATINGS

- A. A specimen/sample is received by the Analysis and Identification Branch<sup>[4]</sup> and an unrated organism is identified. The identifier, because of incomplete identification or insufficient information, may assign a “Q” rating if the organism is believed to be of economic importance, documenting the reason(s) for the rating.
- B. If the organism is of no economic importance or is a beneficial, the identifier may assign a “D” rating. No further action is required.
- C. To assign a permanent “A”, “B”, or “C” pest rating, the identifier presents supporting documentation to the appropriate primary state professional, and they reach an agreement on a proposed rating.
- D. The Branch Chief of Analysis and Identification<sup>[4]</sup> is then notified in writing by the primary state professional of the proposed rating and reasons why this rating was selected.
- E. The Branch Chief of Analysis and Identification<sup>[4]</sup> notifies the Assistant Director<sup>[2]</sup> of Plant Industry<sup>[3]</sup> and the Division Branch Chiefs of the proposed “A”, “B”, or “C” rating and the reasons supporting the proposed rating. If there are no valid objections within two weeks, the Branch Chief of Analysis and Identification<sup>[4]</sup> will assume concurrence and notify the county agricultural commissioners of the proposed rating. The rating is established 30 days later if no adverse comments are received and there is no request for a formal meeting of the appropriate Division Pest Study Team.

- F. Other state agencies, such as Fish and Game, Health and Forestry, will be consulted regarding their position on proposed ratings for those organisms involving their regulatory or public responsibilities.
- G. Adverse comments, if any, will be reviewed by the identifier and the appropriate primary state professional. If necessary, they will be referred to the Division Pest Study Team and/or the Assistant Director<sup>[2]</sup> for resolution. A request for a formal meeting of the Division Pest Study Team is to be accompanied by the reasons/supporting data for the request.
- H. The Division Pest Study Team, if convened, will recommend a pest rating to the Assistant Director<sup>[2]</sup>, Division of Plant Industry<sup>[3]</sup>.
- I. The Branch Chief of Analysis and Identification<sup>[4]</sup> will issue the “Important Notice” of the assigned rating.
- J. All “Q”-rated pests known to be established in California will be reviewed every March by the primary state professionals to determine if the “Q” status should be continued or if a permanent rating should be proposed. A written report on each review will be prepared and sent to the Branch Chiefs and the Assistant Director<sup>[2]</sup>. Any proposed permanent rating will be handled as outlined in steps D through H.
- K. If the Director<sup>[1]</sup> determines that an unrated pest poses a major threat to California’s agriculture or environment, the Director’s<sup>[1]</sup> Statement of Findings regarding that pest supercedes this document.

#### IV. PROCEDURE FOR CHANGING ESTABLISHED RATINGS

- A. Any interested person may recommend a change in an established rating by submitting a request to the Assistant Director<sup>[2]</sup> for Plant Industry<sup>[3]</sup>. The Assistant Director<sup>[2]</sup> will refer the request to the appropriate primary state professional.
- B. To change an “A”, “B”, “C”, or “D” pest rating, the proposer presents supporting documentation to the appropriate primary state professional, and they reach agreement on the proposed rating change.
- C. The Branch Chief of Analysis and Identification<sup>[4]</sup> is then notified in writing by the primary state professional of the proposed rating change and reasons why this rating was selected.
- D. The Branch Chief of Analysis and Identification<sup>[4]</sup> notifies the Assistant Director<sup>[2]</sup> of Plant Industry<sup>[3]</sup> and the Division Branch Chiefs of the proposed rating change and the reasons for it. If there are no valid objections within two weeks, the Branch Chief of Analysis and Identification<sup>[4]</sup> will assume concurrence and notify the county agricultural commissioners of the rating change. The new rating is established 30 days later if no adverse comments are received and there is no request for a formal meeting of the appropriate Division Pest

Study Team.

- E. Other state agencies, such as Fish and Game, Health, and Forestry, will be consulted regarding their position on proposed rating changes for those organisms involving their regulatory or public responsibilities.
- F. Adverse comments, if any, will be reviewed by the appropriate primary state professional. If necessary, they will be referred to the Division Pest Study Team and/or the Assistant Director<sup>[2]</sup> for resolution. A request for a formal meeting of the Division Pest Study Team is to be accompanied by the reasons/supporting data for the request.
- G. The Division Pest Study Team, if convened, will recommend a pest rating to the Assistant Director<sup>[2]</sup>, Division of Plant Industry<sup>[3]</sup>.
- H. The Branch Chief of Analysis and Identification<sup>[4]</sup> will issue the “Important Notice” of the new assigned rating.

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[1] ≡ Secretary of CDFA  
[2] ≡ Division Director  
[3] ≡ Plant Health and Pest Prevention Services division  
[4] ≡ Plant Pest Diagnostics Branch



# Complaints of Adverse Reactions to Aerial Spraying in Monterey and Santa Cruz Counties

January 3, 2008

*Compilation report by Helping Our Peninsula's  
Environment detailing the health complaints from the  
aerial sprayings in Monterey and Santa Cruz counties.*

# COMPLAINTS OF ADVERSE REACTIONS TO AERIAL SPRAYING IN MONTEREY AND SANTA CRUZ COUNTIES

Mike Lynberg  
P.O. Box 1612, Pebble Beach CA 93953

David Dilworth  
Helping Our Peninsula's Environment (HOPE)  
P.O. Box 1495, Carmel CA 93921

*Additional Support by:*  
California Alliance to Stop the Spray  
Coalition for Sustainable Action  
Pesticide Watch Education Fund

January 3, 2008

## EXECUTIVE SUMMARY

### **A Review of 643 Documented Complaints of Adverse Reactions Following the CDFA's Aerial Spraying of two Pesticides based on Pheromones over Densely Populated Neighborhoods in Santa Cruz and Monterey Counties in September, October, and November 2007**

Full report online at <http://www.1hope.org/chkmate.htm> (under "Pesticide Harm Overview")

As of December 20, 2007 various governmental agencies and citizen groups have received **643** documented complaints from Monterey and Santa Cruz area citizens who believe they suffered adverse short-term reactions following the aerial spraying of pesticides pheromones on their cities in September, October, and November 2007.

Of the 643 complaints, 509 are reported here for the first time, along with the original 134 citizen complaints of adverse reactions following the aerial spraying of the Monterey area in September which released to state agencies and the press in October.<sup>1</sup>

#### **Summary of the Complaints**

Citizens complained of a variety of adverse reactions immediately and soon after the aerial spraying, including:

- Asthma attacks
- Bronchial irritation
- Lung congestion and soreness
- Difficulty breathing and shortness of breath
- Coughing or "wheezing"

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<sup>1</sup> The total number of complaints reported in the press in September and October grew to more than 200 as governmental representatives, referring to the adverse reactions, likely added complaints they had received directly to the count, and referred to these in their communications (see "Laird Response to Sec. Kawamura," dated October 16, 2007, page 4, which referenced 200 complaints). These extra complaints are not included in the tally of 643 referenced in this report; only the 134 complaints received through [ReactiontoSpraying@yahoo.com](mailto:ReactiontoSpraying@yahoo.com) last fall, and forms sent to the related P.O. Box.

- Skin rashes (sometimes severe)
- Vision blurred
- Eye irritation
- Sore throats
- Nasal congestion
- Sinus bleeding
- Chest pains and tightness
- Heart arrhythmia and tachycardia (irregular and rapid heartbeat)
- Headaches (sometimes debilitating)
- An inability to concentrate and focus
- Dizziness
- Muscle aches
- Body tremors
- Intestinal pain and diarrhea
- Nausea
- Swollen glands and lymph nodes in neck and under arms
- Feelings of lethargy and malaise
- Menstrual cramping, an interruption to menstrual cycles, and in some cases a recommencement of menstrual cycles after menopause

Several people reported severe reactions, and others have required emergency room visits. Some said the effects of the spraying were debilitating and made it impossible for them to focus, work, and take part in their normal activities. Many report they have never had any similar symptoms previously.

People with less severe reactions generally said they went on with their day-to-day responsibilities, although with diminished capacity, and did not call or visit their doctors because they did not want to take the time or incur the expense, or could not get a short-term appointment.

A number of people said they had left their homes during the spraying and experienced symptoms immediately upon returning. A tourist visiting Monterey from Pennsylvania said her symptoms appeared as soon as she got near the area after driving north on Highway One from the Hearst Castle in San Simeon.

Some reported that several members of their families experienced unusual symptoms at nearly the same time shortly after the spraying. Several said their domestic animals also experienced adverse reactions. Two pets died after developing symptoms similar to those reported by humans.

### **Complaint Sources**

Today's report cites 317 complaints of adverse reactions received directly by the CDFA since the spraying began, 52 of which were detailed illness reports. It also cites 36 reports of illnesses sent by doctors to the Santa Cruz County Agriculture Commissioner's office. Public interest groups received 290 complaints, which are documented in the report.

### **Potential Complaint Duplication**

Because there is no single agency and no single well publicized system for tracking and investigating adverse reactions to the aerial sprayings, there is likely some overlap in the 643 complaints, if people filed complaints with more than one entity.

### **Underreporting Breadth of Illnesses And Symptoms**

The report explains why the official numbers under-report the numbers of people with illnesses and symptoms and how complaints inherently cannot include potential long-term adverse health effects.

- Sometimes a single complaint was submitted for several members of the same family, and on one occasion, one complaint was submitted for a family of six, all of whom got sick.
- There is evidence some people could not afford the time or expense of a doctor visit, or could not get an appointment, while others did not know how to register complaints of adverse reactions. Meanwhile, some health care providers were not prepared to recognize and report possible pesticide-related illnesses or were not aware of state law requiring them to report suspected pesticide poisonings within 24 hours.

“Midway through the aerial sprayings, the CDFA stated that the only way complaints of illness would be taken seriously is if they were validated by a doctor. However, I have patients who told me that other doctors refused to file a report on their reactions, even though it is required by law.”

– Randy Baker, MD, *a family physician practicing environmental medicine in Soquel*

- The present tally of 643 complaints does not include complaints that have been made directly to the offices of Governor Schwarzenegger and other elected officials. Citizen groups have asked the Governor’s office to disclose this information. They also continue to gather illness complaints through various channels, including an email address, [ReactiontoSpraying@yahoo.com](mailto:ReactiontoSpraying@yahoo.com). The number of documented complaints count should rise as the Governor’s office, city governments, and governmental representatives pass along complaints they have received directly from citizens. There is no law requiring these offices to forward pesticide harm complaints.

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### **Putting Health and Safety First**

Despite assurances by the CDFA that the spraying would be safe, many community leaders remain concerned after learning of the larger scale of documented complaints.

“While California’s agriculture business is vitally important, no one, including the Governor, I think, wants to sacrifice the health of children and other vulnerable

citizens for produce. That's why the spraying needs to stop so we can have a thorough public process including an Environmental Impact Report."

– Tony Madrigal, *Santa Cruz City Council*

"The science establishing the safety of the spraying simply is not there. In effect, this has been an experiment on a grand scale. The Nuremberg Code, which is adhered to by the National Institutes of Health, prohibits medical experimentation on human subjects without their informed consent. I believe the same code of ethics should be adhered to in this situation."

– Dr. Doug Hulstedt, *pediatrician, Monterey*

"The number of people who have reported adverse reactions is alarming, and I believe further spraying must be halted until we can be certain it is safe."

– Emily Reilly, *Santa Cruz City Council member*

"Protecting those who are most vulnerable is a hallmark of our society, and while the aerial spraying might not adversely impact everyone, there is reason to believe it is harming some people, including those with chemical sensitivities, impaired immune systems, and asthma and other respiratory ailments. The rights of these citizens need to be protected."

– Jeff Haferman, *Monterey City Council member*

"Article One of the California Constitution clearly states that all people have a right to pursue and obtain safety, and the aerial spraying of synthetic pheromones and other chemicals on neighborhoods, playgrounds and schools could be in violation of this right."

- Mike Lynberg of *Concerned Citizens Against Aerial Spraying*.

"We, as elected officials, have a responsibility in matters of public safety to make sure that decision-making process is transparent to the citizenry. Thus far, the state has not lived up this standard."

-- Ryan Coonerty, *Santa Cruz Mayor*

"Far more effective non-spraying alternatives exist. Aerial spraying has been called the 'least effective' way to control the light brown apple moth because at least 99 percent of the spray has no effect on the widely dispersed moths at all. A more effective and less costly solution is targeted, pheromone-scented sticky traps<sup>2</sup>, which the state has used to trap essentially all the 9,000 moths they've caught in California so far."

– David Dilworth, *Executive Director, Helping Our Peninsula's Environment (HOPE)*

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<sup>2</sup> **Targeted pheromone-baited Sticky Traps are the only solution to catch and kill the LBA moths.** Twist ties and aerial spraying do not catch or kill the LBA moths. "Targeted" sticky traps are used only where the moths are found. This is in sharp contrast to saturation trapping to cover an entire region. For more detailed information on this effective and less expensive solution please see [Ihope.org/checkmate](http://Ihope.org/checkmate)

“Given the number and seriousness of the health complaints, and the heavy presence of the Checkmate LBAM F capsules in the river and along Cowell Beach after the spraying, I think there is reason to believe that a line has been crossed and that the aerial spraying is not environmentally responsible, possibly violating the authority under which it was initiated.

– Ed Porter, *Member of the Santa Cruz City Council*

“CDFA has undertaken aerial spraying under the pretext of an emergency. Clearly there is no emergency in the legal sense. An emergency is a sudden and unexpected occurrence threatening life and property. There is no way in law that the LBAM situation can be considered an emergency.”

- Ed Porter

“Unfortunately, many people did not know how to register complaints of adverse reactions, and primary care health providers were not adequately instructed how to recognize and report possible pesticide-related illnesses among their patients. Also, citizens and health practitioners were assured by the CDFA that the spraying would not make anyone sick, so it's possible that many attributed their adverse reaction to other causes.

Randy Baker, MD, *a family physician who practices environmental medicine in Soquel*

“Midway through the aerial sprayings, the CDFA stated that the only way complaints of illness would be taken seriously is if they were validated by a doctor. However, I have patients who told me that other doctors refused to file a report on their reactions, even though it is required by law.”

– Randy Baker, MD

“Unfortunately, there is very little in the way of objective testing doctors can do to tell if a complaint actually is related to chemical exposures. And many people could not afford the time or expense of going to a doctor, or could not get a timely appointment. Should their complaints be ignored?”

- Randy Baker, MD

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## METHODOLOGY: HOW THE COMPLAINTS WERE COMPILED

Mike Lynberg, a husband and father of two in Pacific Grove, who is also a bestselling author and business writer, was concerned about the safety of spraying untested pesticides on large urban populations and started Concerned Citizens against Aerial Spraying in September 2007. Then, when some of his friends and neighbors had adverse reactions to the aerial spraying, he began to collect and compile their complaints, and to seek records of complaints from other sources.

Collected and compiled by Lynberg, this report includes or makes reference to:

- **317** citizen complaints submitted by citizens directly to the CDFA; 52 of them in the form of detailed illness reports, and 265 in the form of phone calls, email messages and other correspondence. These 317 complaints, disclosed to Lynberg by the CDFA on December 20, 2007, are the total received so far by the CDFA following all three rounds of spraying in Monterey and Santa Cruz Counties.
- **290** citizen complaints of illnesses have so far been received by public interest groups, including via a dedicated email address, [ReactiontoSpraying@yahoo.com](mailto:ReactiontoSpraying@yahoo.com), a dedicated P.O. Box, and two citizen petitions. Of the complaints, 134 followed the first round of spraying in the Monterey area in September, and 156 of them followed the second round of spraying in the Monterey area in October and the first round of spraying in the Santa Cruz area in November.
- **36** complaints submitted by local physicians to the Santa Cruz County Agriculture Commissioner's office following the November spraying in that county, consistent with a law that requires physicians to report illnesses that could be pesticide-related. These reports of illnesses are being investigated by Sean Fields, an inspector in that office, and will be forwarded by it to the appropriate state agencies at a later time.

While care has been taken to delete duplicate complaints in this report, there could be some overlap (i.e., some people might have reported their adverse reactions to more than one entity). That overlap, to a significant degree, results from the lack of a single, well planned and managed system for tracking and investigating adverse reactions, established and funded by the state, and ideally undertaken by a reliable and trusted third party, and peer reviewed by experts in the area of pesticide-related illnesses.

Despite possible duplicate complaints, HOPE believes the known complaints are likely just a fraction of the total illnesses linked to the spraying for the reasons described above.

Moreover, in late October, the CDFA began to say publicly that the only way citizens' complaints of illnesses would be taken seriously is if they were validated by a doctor. "What about people who could not afford the time or expense of going to a doctor, or who couldn't get an appointment?" asks Lynberg. "Are their complaints not worth taking seriously?"

Finally, the total number of complaints in this report is likely to be much lower than the actual number of people who believed they suffered adverse reactions to the aerial spraying because the complaints reported herein do not include:

- Complaints of illnesses received by Governor Schwarzenegger's office
- Complaints of illnesses and adverse reactions received by other elected officials such as state and federal representatives
- Calls, messages and letters sent by people who believe they got sick to the mayors of the city clerks of the many cities sprayed
- Complaints of illnesses received directly by the Monterey and Santa Cruz County Health Officers

Working with other public interest groups, Lynberg is presently working to obtain this information so it can be publicly disclosed. In time, the total number of citizen complaints of adverse reactions related to the aerial spraying of urban populations in California in late 2007 could grow.

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### **CDFA Could Spray Continuously through 2010**

The California Department of Food and Agriculture (CDFA) agency declared an emergency and obtained a permit from the US-EPA to spray urban populations through 2010, as often as every 30 days, and to do so without any advance testing of the pesticide's health harm to humans.

Three rounds of aerial pesticide spraying using two different pesticides<sup>3</sup> occurred late last year beginning on the Monterey Peninsula and then expanding to Santa Cruz County. Each round involved airplanes spraying untested pesticides at high-speed<sup>4</sup> largely over densely populated areas from 500 - 800 feet above the ground<sup>5</sup>. At that altitude there is considerable sideways drift of the pesticides, potentially miles from the release location.

The pesticide ingredients and concentrations are a closely held secret. Two days after an LA Times editorial the Governor released a few of the names of ingredients of only one of the two pesticides. The disclosed ingredients include a synthetic pheromone

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<sup>3</sup> Checkmate OLR-F and Checkmate LBAM

<sup>4</sup> 160 mph.

<sup>5</sup> Crop dusting normally takes place only a few yards above the ground and at speeds below 100 mph.

as the active ingredient, and variety of so-called "inert" ingredients<sup>6</sup>. Some of the disclosed ingredients are known to be hazardous at certain levels. Concentrations of the ingredients and chemical residues of the manufacturing process were not disclosed. US-EPA has explicitly refused to disclose that information on an expedited basis.

The tiny light brown apple moth has been widely across California from Los Angeles to Napa, including highly populated areas such as San Francisco, Berkeley and Marin County. *The LBA moth does not cause physical harm to people which is in sharp contrast to the West Nile Virus.*

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<sup>6</sup> Pesticides almost always contain chemicals that are secrets, misnamed inerts. "Despite their harmless sounding name, **many so-called inerts are dangerous chemicals that can cause cancer, reproductive harm, nervous system damage and other health effects.**" (NCAP Report "Toxic Secrets")

## RECOMMENDATIONS & ALTERNATIVE SOLUTIONS

There are three broad questions related to the recent aerial spraying of pesticides using pheromones and potentially toxic “inert” ingredients by the State of California on hundreds of thousands of its citizens:

- Is it necessary?
- Can it be effective?
- Is it safe?

Experts have expressed opposing viewpoints on whether the aerial spraying is necessary or effective. For example, Jim Carey, a professor of entomology at the University of California-Davis and a respected Invasion Biology expert, has cast doubt on whether the aerial spraying can be effective, saying the pest is too established to be eradicated. “This thing is so widespread that there is no way that they're going to eradicate it,” said Carey in a *Monterey Herald* interview in December. When a pest is not eradicatable, we can only try to control it. Pest control requires dramatically less urgency and less draconian measures than eradication.

While the first two questions are critical, and while some experts believe the spraying is neither necessary nor effective, this report is primarily focused on complaints of adverse reactions to the spraying.

Out of a deep concern for the health and safety of our families, friends and neighbors, HOPE and those supporting this report strongly and respectfully recommend that :

1. The State of California immediately stop further aerial spraying to eradicate the light brown apple moth, given the evidence the spraying may significantly harm human health and is therefore not being done in an “environmentally responsible” way, as described in Senate Bill 556.
2. Our governmental representatives vigorously defend and uphold every citizen’s **constitutional right to pursue and obtain safety**, as established in the California State Constitution, Article One, Section One.
3. The State of California abide by international codes of ethics pertaining to experimentation on human subjects without their informed consent (such as the Nuremberg Code adhered to by the National Institutes of Health), since the chemical mixtures being sprayed have not, prior to the wholesale spraying of large urban populations, been tested for their health effects on human beings.
4. The health complaints received so far be thoroughly investigated by an objective and trusted third party – not by an agency or organization that serves or supports agriculture

and related interests – and peer reviewed by panel of experts in the fields of toxicology, environmental medicine and other appropriate disciplines. The California Dept of Public Health may be a good start.

5. The ingredients in the products being sprayed on unwitting populations be thoroughly disclosed, including their relative concentrations and the residues that result from their reaction, and this data be studied by an objective and trusted third party -- not an agency with a clear conflict of interest and loyalty to agricultural and economic interests such as CDFA and DPR, and peer reviewed by an appropriate panel of independent toxicologists, physicians and other specialists.

6. The State of California prepare a thorough Environmental Impact Report that includes the findings of the investigations into the spray's ingredients and the adverse health effects among the population, and objectively and thoroughly evaluates non-spraying alternatives.

7. The CDFA implement non-spraying solutions to eradicate or control the light brown apple moth, such as the targeted pheromone-scented sticky traps it has used successfully to trap essentially all the 9,000 LBA moths found in California so far, instead of measures that put people at risk and possibly sacrifice their health and safety for the interests of others.

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# SRC 87

April 28, 2008

*Full text of the resolution passed by the State Senate Committee on Environmental Quality, chaired by Joe Simitian.*

AMENDED IN SENATE MAY 5, 2008

**Senate Concurrent Resolution**

**No. 87**

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**Introduced by Senator Migden**  
*(Coauthors: Senators Corbett and Simitian)*  
*(Coauthors: Assembly Members Hayashi and Huffman)*

February 27, 2008

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Senate Concurrent Resolution No. 87—Relative to the light brown apple moth.

LEGISLATIVE COUNSEL'S DIGEST

SCR 87, as amended, Migden. Light brown apple moth.

This measure would request the Department of Food and Agriculture to impose a moratorium on any aerial spraying that may be a part of the department's eradication campaign of the light brown apple moth until the department can demonstrate that the pheromone compound it intends to use is both safe to humans and effective at eradicating the light brown apple moth.

Fiscal committee: no.

- 1 WHEREAS, The presence of the light brown apple moth  
2 (LBAM), which is originally from Australia, has been confirmed  
3 in 12 counties, which include Alameda, Contra Costa, Los Angeles,  
4 Marin, Monterey, Napa, San Francisco, San Luis Obispo, San  
5 Mateo, Santa Clara, Santa Cruz, and Solano, since its discovery  
6 in California by the Department of Food and Agriculture and the  
7 United States Department of Agriculture in March 2007; and  
8 WHEREAS, The introduction of the LBAM represents a danger  
9 to California's natural environment and agricultural industry; and

1 WHEREAS, The United States Department of Agriculture is  
2 testing the efficacy of the aerial spraying of pheromones, a  
3 substance that disrupts the mating of the LBAM, conducted in  
4 New Zealand to eradicate the LBAM, but these tests have not been  
5 completed and the efficacy results of the tests are not known; and

6 WHEREAS, More than 16,000 LBAMs were found in the bay  
7 area and most of these moths were found in the epicenter, which  
8 is Monterey and Santa Cruz Counties; and

9 WHEREAS, According to the Department of Food and  
10 Agriculture, aerial spraying for the LBAM is needed in 10 bay  
11 area counties and the department is developing a new formula to  
12 use to eradicate the LBAM, which was not the one used in the  
13 Monterey and Santa Cruz areas in 2007, but the department has  
14 not disclosed all of the ingredients; and

15 WHEREAS, Over 600 health complaints were tallied after aerial  
16 spraying for the LBAM in Monterey and Santa Cruz Counties last  
17 year, raising serious questions about the safety of the spray to  
18 humans. During ~~the aerial spraying, the~~ *aerial spraying*, planes  
19 doused cities, suburbs, and rural areas with a pheromone called  
20 CheckMate, which regulators initially said ~~carried~~ *contained* a  
21 harmful ingredient, and then said it did not. Moreover, the health  
22 effects in the bay area cannot be predicted because the population  
23 includes sensitive groups, including children, the elderly, pregnant  
24 women, and people with chronic disease; now, therefore, be it

25 *Resolved by the Senate of the State of California, the Assembly*  
26 *thereof concurring*, That the Department of Food and Agriculture  
27 is requested to impose a moratorium on any aerial spraying that  
28 may be a part of the department's eradication campaign of the light  
29 brown apple moth until the department can demonstrate that the  
30 pheromone compound it intends to use is both safe to humans and  
31 effective at eradicating the light brown apple moth; and be it further

32 *Resolved*, That the Secretary of the Senate transmit copies of  
33 this resolution to the Department of Food and Agriculture and the  
34 author for appropriate distribution.

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# NRDC Position Statement for Spraying For the Light Brown Apple Moth in California

November 14, 2007

*Explains that while the NRDC generally supports the use of pheromones in place of pesticides, more testing should be done to determine the size of the plastic capsules and to evaluate the feasibility of alternatives.*



**NRDC Position Statement on Spraying  
For the Light Brown Apple Moth in California  
November 14, 2007**

**Background**

The Light Brown Apple Moth (LBAM) is a plant pest that was originally native to Australia. According to the California Department of Food and Agriculture (CDFA), the LBAM was recently discovered for the first time in the United States – in parts of the San Francisco Bay area and central coast of California. CDFA expects that this pest could cause serious damage to natural systems, backyard gardens, and to the economy, including a projected possible economic loss to California of over \$100 million. In addition, there is apparently concern that the pest could spread throughout a major portion of the United States. The LBAM does not pose a health threat to people.

CDFA reports that the current infestation by the LBAM is relatively new, and that the population of moths is small. They have consulted with an international panel of expert scientists convened by the USDA which has concluded that it may be possible to eradicate the LBAM in California. As a result of this determination, CDFA declared a state of emergency, has begun an eradication campaign in Monterey County and Santa Cruz, and plans to expand the campaign northward into the San Francisco Bay area.

CDFA is primarily using a pheromone product called CheckMate, applied via aerial spraying. Aerial spraying began in Monterey County in September 2007 and in Santa Cruz County in October 2007. In addition to the aerial spraying, CDFA is using the organophosphate insecticide chlorpyrifos to attempt to eradicate the LBAM at nurseries, and has quarantined areas where the pest has been found.

**NRDC's Position: Support for Pheromone-Based Eradication with Reservations**

On September 8, 2007, NRDC responded to a request from Assemblymember John Laird stating support for the use of the pheromone CheckMate. The letter stated, in part: “we applaud CDFA’s decision to use an approach to the LBAM that relies on the principles of [integrated pest management] and that uses a pheromone-based approach instead of toxic insecticides. We hope that the prompt use of such a strategy will help to avert future use of insecticides to control this pest.”

NRDC still believes that there are unlikely to be toxicity concerns with the pheromone spraying. Unlike pesticides, pheromones are not toxic to living things, and would not be expected to have adverse effects on human health or the environment. Pheromones are used in organic agriculture and are a major component of integrated pest management (IPM) approaches. NRDC is also concerned that the establishment of LBAM in California could result in a significant increase of insecticide use in the future as farmers, landscapers and others take matters into their own hands

to control this pest. Therefore NRDC still supports the approach of using pheromones instead of insecticides to eradicate or control this pest. However, numerous valid concerns have arisen over the past months about the aerial spraying program. Some of these concerns relate to health and the environment; others relate to issues of informed consent, autonomy, and public process. NRDC strongly recommends that these concerns be addressed if the spraying program moves forward. The concerns are itemized below.

### **1. Health Concerns about “Inert” Ingredients and Respirable Particles**

Although few people have expressed health concerns about the pheromone itself, the CheckMate product also contains a variety of other ingredients. Some of these “inerts” have raised questions and potential health concerns. Initial reports that the product contained an isocyanate appear to be false.<sup>1</sup> In October, the full list of ingredients was released, and there are no ingredients that are considered to be toxic. However, at sufficiently high doses some of the ingredients (such as tricapyryl methyl ammonium chloride) might be irritating to the mucus membranes.

According to the manufacturer, the average particle size of the microcapsules is in the range of 100-150 microns ( $\mu\text{m}$ ). This is a size range that is not considered to be respirable. Particles of this size would lodge in the nose or throat and would not reach the lungs. As such, these particles could potentially be irritating to the upper airways, but are not likely to be a serious health hazard. The full size distribution of the particles in CheckMate remains unclear.

It would be relatively easy to test the spray to ascertain whether there are respirable-range particles in the mixture. To our knowledge that has not been done. It would also be easy to test the final product for isocyanate residues from the manufacturing process. In addition, the inert ingredients suggest the possibility that sensitive individuals might experience some irritation of the mucus membranes and upper airways if exposed to a sufficiently high concentration of this product. CDFA should consult with experts to consider whether there should be special warnings for asthmatics and those with respiratory sensitivities.

### **2. Need for Improved Environmental Monitoring and Tracking of Health Complaints**

It is essential that an aerial spraying program include a well-designed and comprehensive monitoring effort on the ground. It appears that the limited monitoring that is being done on the ground is focused primarily on minimizing carry-over to no-spray zones and on ascertaining that the entire area is adequately covered. Ground-level monitoring for respirable particulate matter, and for airborne concentrations of potentially irritant inert ingredients, is important in order to provide an extra safety check. In addition, monitoring of surface waters to assure that surfactants and phosphates in the product are not impairing local waterways is critical.

Many residents of the Monterey area complained of health symptoms after the spraying. Although it is unlikely that these symptoms are related to toxicity from the spray, the complaints nonetheless need to be taken seriously to make sure that there is no unanticipated problem with the product. Residents have a right to know that any health complaints will be easy to report, diligently mapped and tracked, and investigated fully. Residents have not felt that CDFA is taking their health complaints seriously. Clinical personnel must be available to answer questions and to quickly follow-up on complaints by gathering histories, symptoms, laboratory findings, and clinical findings. If any unusual or unanticipated patterns emerge, it will be essential to detect the problem quickly and reevaluate the program.

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<sup>1</sup> An isocyanate, polymethylene polyphenol isocyanate, is apparently used in the manufacture of the product and could conceivably be in the final formulation in trace quantities. Other isocyanate chemicals are known sensitizers and asthmagens.

### **3. Full Exploration of Alternatives**

Alternatives to aerial spraying, such as ground-based spraying and non-spray methods are available (eg. twist-tie applications). CDFA has rejected these approaches as too costly. However in some cases, communities have offered to provide volunteers to help implement these methods. Although the pheromone spray is not considered to be toxic, it would still be more precautionary to avoid spraying any chemicals over inhabited areas. Therefore non-spray alternatives should be fully explored and used whenever at all feasible. For example, if a substantial and well-coordinated volunteer effort were available in a tract to hang twist-ties, that area could potentially be skipped in the aerial spraying. Spraying could then be reserved for forested areas that are too dense to allow practical use of these alternatives.

### **4. Avoiding Any Use of Pesticides**

The emergency exemption that CDFA is using in order to undertake the pheromone spraying can also allow spraying with toxic insecticides. In fact, the highly dangerous insecticide chlorpyrifos is currently being used to spray for LBAM in nurseries. It is essential that CDFA avoid using insecticides except as a last resort. If insecticides must be used, they should be the least toxic available. Choosing an organophosphate insecticide such as chlorpyrifos, that is among the most toxic (and drift-prone) products on the market, sets a bad precedent. If the LBAM infestation spreads, there are serious concerns that there will be broader use of toxic insecticides. NRDC opposes the use of insecticides for LBAM eradication or control, since alternative approaches are available. In particular, we strongly oppose the use of organophosphate products such as chlorpyrifos.

### **5. Improving Community Outreach and Participation**

Public process issues have been a major concern. We have heard many complaints that public meetings have not been scheduled with sufficient lead-time, members of the public feel that their concerns are not taken seriously by CDFA officials, and public notification has not always been adequate prior to spraying events. In addition, CDFA is convening an LBAM Environmental Advisory Task Force, but has been resistant to having community representation in the group. Instead, they are inviting organizations that support the spraying to join the Task Force. CDFA must engage in open and constructive dialogue with those who are raising legitimate concerns about the spraying.

*For additional information, please contact:*

*Gina Solomon, M.D., M.P.H., Senior Scientist, 415-875-6100, or [gsolomon@nrdc.org](mailto:gsolomon@nrdc.org).*



# But Who Will Guard the Guardians?

April 15, 2008

*Detailed response to and criticism of the NRDC position supporting the spraying.*

April 15, 2008

Dr. Gina Solomon, Physician and Senior Scientist with NRDC  
Natural Resources  
Defense Council  
40 West 20th Street  
New York, NY 10011

11 Sutter St., 20th floor  
San Francisco, CA 94104  
415-875-6100

Dear Dr. Solomon,

### **But Who Will Guard the Guardians?<sup>1</sup>**

Child care facilities and other members of the public place unquestioned trust in the NRDC. Unsurprisingly, the CDFA boasts of the NRDC November 14, 2007, endorsement of the spraying project quoting Dr. Gina Solomon, stated to be a Physician and Senior Scientist with NRDC, as follows:

On September 8, 2007, NRDC responded to a request from Assembly member John Laird stating support for the use of the pheromone Checkmate. The letter stated in part: '*we applaud CDFA's decision to use an approach to the LBAM that relies on the principles of [integrated pest management] and that uses a pheromone-based approach instead of toxic insecticides. We hope that the prompt use of such a strategy will help to avert future use of insecticides to control this pest.*'

NRDC still believes that there are *unlikely* to be toxicity concerns with the pheromone spraying. Unlike pesticides, pheromones are not toxic to living things, and would *not be expected* to have *adverse effects on human health or the environment*. Pheromones are used in organic agriculture and are a major component of integrated pest management (IPM) approaches. NRDC is also concerned that the establishment of LBAM in California could result in a significant increase of insecticide use in the future as farmers, landscapers and others take matters into their own hands to control this pest.

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1 An ancient question posed in Roman times by Juvenal because the guards sent to guard men's wives, who could not be trusted, could themselves also not be trusted: "sed quis custodiet ipsos custodes?" When directed at the regulators and today's leaders, the answer remains the same: the public and its social trustees must and will. Professor Emeritus Leonid Hurwicz rejected the unwavering trust Plato had in city-state leaders in his compelling acceptance of the 2007 Sveriges Riksbank nobel prize in economics sciences in his lecture entitled "But Who Will Guard the Guardians." Prof. Hurwicz explained eloquently his mechanism design theory which posited that leaders and officials of political, economic, and social entities need a great deal of oversight to ensure enforcement of the rule of law and that oversight comes from the intervenors, individuals of integrity who act without self-interest, whether in profit, power, or donation dollars. <http://nobelprize.org/mediaplayer/index.php?id=786>; [http://www.isd.net/mhurwicz/stories/nobel\\_maxim\\_for\\_leo\\_hurwicz.html](http://www.isd.net/mhurwicz/stories/nobel_maxim_for_leo_hurwicz.html).

[http://www.cdfa.ca.gov/phpps/PDEP/lbam/pdfs/LBAM\\_Support\\_Comments.pdf](http://www.cdfa.ca.gov/phpps/PDEP/lbam/pdfs/LBAM_Support_Comments.pdf). (Emphases added).

The degree of public trust placed in this NRDC endorsement is incalculable. Recent telephone calls to area schools and day care centers revealed that, notwithstanding the CDFA previous advisory that parents should bring in all toys on the eve of spraying and ensure they are cleansed of the spray (which advisory has been deleted from the CDFA web site only recently), these child care facilities cite Dr. Solomon for the proposition that the spraying project is safe. Therefore, these facilities are not going to take protective measures against the effects of the spraying. According to these facilities, the NRDC endorsement reflects that Dr. Solomon considers the spraying project to be safe.

It behooves the NRDC to come forward. Either it must fully endorse the project, despite the lack of scientific data and full evaluation, and proudly display that endorsement on its web site (and not hide it within layers of pages at [http://docs.nrdc.org/health/hea\\_07111501A.pdf](http://docs.nrdc.org/health/hea_07111501A.pdf)) or it must correct its endorsement and at a minimum, explain it fully, loudly, and publicly.

The NRDC, which boasts its scientific prowess, must, as a respected scientist would, state the basis underlying its endorsement. What scientific evaluation and analysis did NRDC perform? What data did it rely upon before so cavalierly issuing an endorsement? Data, evaluations and analyses are not cited in its statement and nowhere available on the NRDC web site. Is it because NRDC issued its endorsement without scientific evaluation? The public would hope not.

The NRDC, a 501(c)(3) entity, is entrusted with the public trust in exchange for which it receives tax exempt status. It owes to the public and its donors the information underlying its endorsement and the basis of its conclusion. It owes the public the scientific basis of its endorsement which the CDFA so publicly touts.

The NRDC represents in its mission statement that its "purpose is to safeguard the Earth: its people, its plants and animals and the natural systems on which all life depends." [www.nrdc.org/about/mission.asp](http://www.nrdc.org/about/mission.asp). NRDC claims that it "work[s] to foster the fundamental right of all people to have a voice in decisions that affect their environment. *Id.* We seek to break down the pattern of disproportionate environmental burdens borne by people of color and others who face social or economic inequities." *Id.*

NRDC represents it is the "nation's most effective environmental action organization." [http://nrdc.org/about/who\\_we\\_are.asp](http://nrdc.org/about/who_we_are.asp). It claims to "use law [and] science" (as well as "the support of 1.2 million members and online activists") to protect the environment. *Id.* NRDC boasts of its powers of influence on its web site that *The New York Times* characterized it as "[o]ne of the nation's most powerful environmental groups." *Id.*

Based on these mission statements, representations, and claims, NRDC raises millions of dollars, has over a million members, has been reported to be one "of the nation's most powerful environmental groups," and is trusted by members of the public. [www.nrdc.org](http://www.nrdc.org). In short, if NRDC says the spraying project is OK, the public will follow.

But, what if it isn't OK? What if the scientific data just isn't in, yet? What if there is a lack of scientific evaluation? Doesn't that make NRDC's endorsement premature if not irresponsible? Doesn't it make NRDC just as responsible as CDFA, Suterra LLC, and the EPA may be for misleading the public into believing the spraying project is safe when the only fact is that the data just isn't in, yet? Has NRDC altered fundamental scientific principles on which it purportedly premises its existence and "power" through its endorsement? Has it not just endorsed the secrecy that permeates this spraying project? Has NRDC not just violated the public trust on which it is premised and with which it raises millions of dollars?

The facts, as have been revealed to the public thus far, appear to demonstrate that the NRDC endorsement of CDFA's apple moth spraying project violates its own precepts on which it raises millions of dollars from the public. It is against these facts that the NRDC endorsement begs the question: "But who will guard the guardians?"

1. No environmental impact study has been completed. [http://www.lbamspray.com/00\\_Documents/2008/LBAM%20lawsuithearingdelayed.html](http://www.lbamspray.com/00_Documents/2008/LBAM%20lawsuithearingdelayed.html); <http://www.scsextra.com/story.php?sid=66202>. So, where's the science to back up the NRDC endorsement?
2. The environmental impact study is not even expected until the fall 2008. [http://www.insidebayarea.com/ci\\_8794022](http://www.insidebayarea.com/ci_8794022).
3. There were significant numbers of significant health complaints after the Monterey, Salinas, and Santa Cruz sprayings. Sounds like scientific data that should be evaluated, yes? Yet, in an April 10, 2008, report, the health complaints summarily were dismissed for "not contain[ing] adequate information," or, in other words, for lack of complete data. <http://www.oehha.org/risk/pdf/LBAM041008.pdf>. But, rather than obtaining the necessary data from those health effects, the powers that be are content to dismiss health complaints and wait for future health complaints and to document them a little better the next time around. Yet, although the test results are not yet in regarding the safety of the spraying project, that missing data poses no bar to the project. Is this the NRDC position as well?
4. The response by the state to those complaints is inadequate and dismissive. And, the NRDC endorsement, likewise, dismisses these complaints, without proper scientific evaluation. Seemingly contradictorily, the NRDC didn't dismiss its complaint of its own nose itching caused by air fresheners which similarly release pheromones into our homes. See ¶¶10b and 10c.
5. The state has littered the internet with colorful literature with pictures depicting the apple moth as a sinister ugly creature contrasted with pastoral landscapes and over-layed with out of context quotes, including a significant one from Dr. Solomon, in its attempt to assuage the fears of Californians. [www.CDFA.ca.gov](http://www.CDFA.ca.gov). The state, by this literature, is treating Californians as children. Yet, the state is not protecting its children with such literature. Is the NRDC, whose stated purpose and on which purpose it opens the public's wallets, endorsing such a condescending approach to what the NRDC calls the public's fundamental right?
6. The state still has not completed a full environmental impact report or study, it does not know what product will be used in the spraying project. [http://www.lbamspray.com/00\\_Documents/2008/LBAM%20lawsuithearingdelayed.html](http://www.lbamspray.com/00_Documents/2008/LBAM%20lawsuithearingdelayed.html); <http://www.scsextra.com/story.php?sid=66202>. Is the NRDC content with what effectively is its equally blind endorsement?
7. Pursuant to the CDFA March 13, 2008, letter addressed to the task force members, CDFA still is evaluating even the particulate size of but one of the products that is under consideration.

[http://www.cdfa.ca.gov/phpps/PDEP/lbam/pdfs/ETF/Letter\\_and\\_LBA\\_M-F\\_PSA.pdf](http://www.cdfa.ca.gov/phpps/PDEP/lbam/pdfs/ETF/Letter_and_LBA_M-F_PSA.pdf). And, in an April 1, 2008, letter, the CDFA writes “to update” the task force on the “status” of toxicity and environmental toxicity tests,” stating that the USDA “is contracting a battery of acute toxicity tests” “in response to [an EPA] request.” CDFA further announces that it “has decided to conduct more fresh water aquatic toxicity tests” and “to do marine larval mussel toxicity tests.” The tests results clearly are not yet in. Again, how can NRDC scientifically endorse a project when the product to be used remains unknown, unevaluated, and untested?

8. The information made available by CDFA and available elsewhere is contradictory as to the use of surfactant in the product, which, NRDC and Dr. Solomon, as a scientist, must know, is critical in any "scientific" conclusion as to the impact and adverse effects of the spraying project, particularly on aquatic areas.
9. "America's most effective environmental action organization", raises donation dollars from members of the public based on its scientific expertise and mission statement to protect health and safety of the environment. Nonetheless, without any independent scientific study, without any review of any environmental report (because none exists), without any evaluation of the ingredients to be used in the spraying project (as it remains an unknown what will be used this time around), without any study of the particulate size distribution of the product, NRDC seemingly has suggested that the project is environmentally safe. Powerful, yes. It is that power on which families and child care facilities are basing their decisions to trust the spraying project. Scientifically responsible? No. Violative of an express mission statement? Seems so.
10. The problems with the NRDC "public" statement are multi-fold.
  - a. For mere example, it states that it is pleased that the spraying project will avert the “future use” of insecticides. While carefully crafted, that statement is lacking the requisite full disclosure. The state in fact *is* using insecticides against the apple moth in area nurseries. The February 2008 Environmental Assessment issued by the USDA reveals that pesticides were in fact used in the fall of 2007 in Napa and Oakley and that pesticides or insecticides will continue to be used.  
[http://www.aphis.usda.gov/plant\\_health/ea/downloads/lbam-treatmentprog-02-14-08.pdf](http://www.aphis.usda.gov/plant_health/ea/downloads/lbam-treatmentprog-02-14-08.pdf).
  - b. The NRDC public statement suggests that pheromone IPM is not environmentally unfriendly. Yet, the NRDC in a September 19, 2007, press release, tooted its horn again in attacking pheromones in common household air fresheners and pointed out that the lack of government testing for safety (sound familiar to the spraying project?) is a “crack[] in our safety system.”  
<http://www.nrdc.org/media/2007/070919.asp>. That crack lies like a fault line under the lack of testing for safety of the spraying project; and the NRDC endorsement freely steps over that line.

- c. Dr. Solomon, on her own web blog, wails on the use of pheromone compounds in air fresheners and concludes because, *inter alia*, they “make[] my throat tickle and [her] nose itch,” they are fundamentally environmentally unsound. [http://switchboard.nrdc.org/blogs/gsolomon/air\\_fresheners\\_how\\_safe\\_are\\_th.html](http://switchboard.nrdc.org/blogs/gsolomon/air_fresheners_how_safe_are_th.html). Yet, her public support of the CDFA apple moth spraying project evidences that while she is protective of her nose and her throat, she seemingly is dismissive of the airwaves and membranes of Californians in the path of the spraying project.
11. It is even more troubling that the NRDC and Dr. Solomon, who now is well aware that the state is relying on one of the NRDC statements, made before any independent scientific study, as apart of its propaganda campaign to push the spraying project through, and who is well aware that the public trust is in her, although not in the state, remain quiet. The public is basing its decision regarding the welfare of themselves and their children on one out of context statement made by NRDC; yet, it and Dr. Solomon are content to let that happen and not correct the record. Is that reflective of an institutional dedication to environmental health, including those of humans?
12. In a March 13, 2008, letter addressing LBAM-F particle size distribution, the state reveals it had no clue as to the particulate matter size involved in the product.<sup>2</sup> The letter references one doctor’s report that the diameter ranges from as small as 10 microns with an average of 30 microns. The letter references a “quick and dirty particle size check” and at least recognizes that “a thorough study be done.” But, the state is content that “it turns out” that the manufacture has just released some information regarding the particle size distribution. So, the state is content to rely on that late revealed self-generated information. Disappointing? Yes. More notably, Dr. Solomon and the NRDC do not (and could not have considered) consider particulate size distribution before making the wholesale endorsement of CDFA. Moreover, this “self” evaluation is of what product? Is it the product that actually will be used in the spraying project? That seems to be a state secret. And whatever is sprayed is supposed to dissolve in order to release the pheromone—so the particulate size is not a constant. Is it a proper step by NRDC towards its mission statement of protecting the environment to rest its endorsement on a state secret or a false presumption?
13. Any scientist worth their degree knows it is independent peer review and analysis that is required to ensure that it is not but mere greed or

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<sup>2</sup> The March 13, 2008, letter represents to have been signed by Robert Leavitt, Ph.D., Branch Chief, Executive Secretary, EATF. However, it bears an illegible signature of someone else. [http://www.cdfa.ca.gov/phpps/PDEP/lbam/pdfs/ETF/Letter\\_and\\_LBAM-F\\_PSA.pdf](http://www.cdfa.ca.gov/phpps/PDEP/lbam/pdfs/ETF/Letter_and_LBAM-F_PSA.pdf). On April 11, 2008, the letter was “revised:” the contents remains the same, but the enclosure from Suterra’s own lab is missing and the letter now, as of April 11, 2008, bears Robert Leavitt’s signature. [http://www.cdfa.ca.gov/phpps/pdep/lbam/pdfs/ETF/Letter\\_and\\_LBAM-F\\_PSA\\_Revised\\_041108.pdf](http://www.cdfa.ca.gov/phpps/pdep/lbam/pdfs/ETF/Letter_and_LBAM-F_PSA_Revised_041108.pdf). Who signed her/his name to the March 13, 2008, letter representing herself/himself to be Leavitt? The letter is written in the first person; who is that? The original signatory? Leavitt? Does the CDFA endorse rubber-stamping? Does NRDC?

some other non-scientific motivation that leads the producer of a product to conclude as it does in its self-evaluation. Surely, the powerful NRDC staff of scientists dedicated to the environment is aware of this fundamental scientific precept. They have evidenced that knowledge in their September 2007 chastising of the sale of common household air fresheners without proper testing.

14. Particle size is a significant scientific fact and remains to be independently evaluated. First, we still don't know what product will be used. The CDFA March 13, 2008 (as "revised" on April (as "revised" on April 11, 2008), letter only references Suterra's self-evaluation of LBAM-F, a product that may or may not be used. In all events, it is inappropriate in any scientific analysis to rely on the manufacturer's self-interested representations. And, most importantly, even Suterra's self-evaluation raises significant concerns as the particulate size appears to be significant—the median size is 97 microns and according to Suterra's "self-study," 1.2% are less than 10 microns. Diluted with water or not, and particularly apropos the fact the product is designed to dissolve, the micron size itself appears at a minimum to implicate inhalation concerns whether at the initial drop or a few days later. Certainly Suterra's "self-study" cannot form the basis of an independent peer review, required of any proper scientific analysis. And, certainly a self-study of one product does not answer the question vis-à-vis the particulate size of the product that ultimately will be sprayed and how that size will vary with time and over what length of time.
15. NRDC represents it will not permit environmental safety to be doled out based on socio-economic abilities. Yet, it recently has been revealed that the spraying project for this purported moth infestation will not be used over some of the more affluent zip codes. One of the stated "reasons" for the spraying project and the NRDC endorsement is that members of the public "may" resort to self-applied pesticides to address this "pest." In other words, the public may "take matters into their own hands." Is the decision not to spray affluent zip codes premised on the notion that the "more affluent" will not self-medicate this "pest" whereas the less affluent will? Does NRDC still consider its endorsement in line with its express purpose of "seek[ing] to break down the pattern of disproportionate environmental burdens borne by people of color and others who face social or economic inequities?"
16. The state has moved away from its tactics of pastoral propaganda pdfs and pamphlets. It now has resorted to fear tactics, documented in an April 15, 2008, report: "State agriculture leaders issued a warning to the city and county Monday that if plans are delayed to spray pheromone over the county by plane to fight the light brown apple moth, another, more potent insecticide could be dropped instead," [http://www.santacruzsentinel.com/ci\\_8929172?IADID=Search-www.santacruzsentinel.com-www.santacruzsentinel.com](http://www.santacruzsentinel.com/ci_8929172?IADID=Search-www.santacruzsentinel.com-www.santacruzsentinel.com). Does the NRDC want its name and its endorsement to be championed by those that employ such tactics of threats and fear mongering? The public needs the NRDC to step forward and elucidate the public on its true position: does it represent that the spraying project is safe or not? In all events, the NRDC must state the scientific basis behind

the endorsement issued by this nation's most powerful environmental action group. By standing mute, at this juncture, the NRDC may as well join in the fear mongering. Or, will it take a state edict that Godzilla will be released to battle the Moth before the NRDC again will speak?

17. The fear tactics recently launched by the state as noted above are particularly reprehensible apropos the fact that the insecticide BT all along has been apart of the government plan to "eradicate" the LBAM and in fact already has been employed in Napa and Oakley. [http://www.aphis.usda.gov/plant\\_health/ea/downloads/lbam-treatmentprog-02-14-08.pdf](http://www.aphis.usda.gov/plant_health/ea/downloads/lbam-treatmentprog-02-14-08.pdf); [http://www.cdfa.ca.gov/phpps/PDEP/lbam/pdfs/SituationReports/Apr08/LBAM\\_Situation\\_Report\\_April\\_4\\_2008.pdf](http://www.cdfa.ca.gov/phpps/PDEP/lbam/pdfs/SituationReports/Apr08/LBAM_Situation_Report_April_4_2008.pdf).
18. The March 12, 2008, testimony by a noted entomologist with UC Davis before the California Committee on Agriculture perhaps reflects what's really going on here vis-à-vis the guardians: As. Dr. James R. Carey testified, there are eight highly statured scientists within the University of California system who believe that the light brown apple moth cannot be eradicated and doubt that it is even a recent invader. Yet, as Dr. Carey states, none are "willing to speak out because either of fear of retribution from the agencies and/or industry with regard to their research support or out of a feeling that supporting eradication efforts (even if blindly) shows their allegiance to agriculture mission." [http://democrats.assembly.ca.gov/MEMBERS/A27/pdf/AssemblyAg\\_Committee\\_LBAM2.pdf](http://democrats.assembly.ca.gov/MEMBERS/A27/pdf/AssemblyAg_Committee_LBAM2.pdf); [http://www.santacruzsentinel.com/ci\\_8807379](http://www.santacruzsentinel.com/ci_8807379).  
Does the NRDC receive government favors or grants, whether from the state or the federal government? Is it reticent to speak out fully and with full disclosure of its sources and its evaluation one way or the other on the spraying project for fear of retribution to its position as the nation's most powerful environmental action group?
19. As an entity entrusted with the public trust and which raises donation dollars based on its self-professed dedication to the environment and represents itself to be "America's most effective environmental action organization," NRDC in fact has taken NO action, but instead is content to issue a statement that the CDFA proudly touts as an endorsement of the spraying project. A statement that NRDC knows anything at all about the efficacy of the spraying project, much less that it knows the project is safe, does not appear to be based on any sound scientific analysis or study. Such an endorsement appears to violate the fundamental precepts that underlie any relevant scientific evaluation and analysis. It also appears to have been made in express violation of the NRDC mission statements and representations. Most importantly, those who hold the public trust are just as responsible for the malfeasance committed by those it blindly endorses, whether silently or by inaction, when they have the power to speak and to act, but do not.

Sincerely,

One of Many Concerned Mothers of the Bay Area, Sandra L. Schmaier

CC:

James Gustave Speth  
Co-Founder, Natural Resources

Dan Tishman; Chair  
Chair and CEO, Tishman Construction Corp. of New York

Frederick A.O. Schwarz, Jr.; Chair Emeritus  
Senior Counsel, Cravath, Swaine & Moore

Adrian W. DeWind; Chair Emeritus  
Paul, Weiss, Rifkind, Wharton & Garrison

Adam Albright; Vice Chair  
Private investor; Environmentalist

Patricia Bauman; Vice Chair  
Co-director, Bauman Foundation

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President and COO, Warner Brothers

Henry R. Breck; Treasurer  
Chair, Ark Asset Management Co., Inc.

[John H. Adams](#); Founding Director  
Chair, Open Space Institute

Richard E. Ayres, Esq.  
The Ayres Law Group

Anna Scott Carter  
Consultant, NRDC; Environmentalist

Joy Covey  
President, Beagle Foundation

Susan Crown  
Principal, Henry Crown and Company; Executive, Foundation Chair, Community Activist

Laurie P. David  
Producer; Activist

Leonardo DiCaprio  
Actor; Environmentalist

John E. Echohawk  
Executive Director, Native American Rights Fund

Bob Epstein  
Co-Founder, Sybase, Inc., and Environmental Entrepreneurs (E2); Organizer and Director, New Resource Bank

Michel Gelobter, Ph.D.  
Founder, CEO, Cooler Inc.

Jill Tate Higgins  
Private investor; General Partner, Lakeside Enterprises, L.P.

Bob Kerrey  
President, The New School

Philip B. Korsant  
Managing Member, Korsant Partners

Ruben Kraiem  
Partner, Covington and Burling

Nicole Lederer  
Co-Founder, Environmental Entrepreneurs (E2)

Maya Lin  
Artist; Designer

Shelly B. Malkin  
Landscape painter; Conservationist

Josephine A. Merck  
Artist; Founder, Ocean View Foundation

Peter A. Morton  
Chair, Founder, Hard Rock Hotel, Inc.

Wendy Neu  
Senior Vice President, Hugo Neu Corp; Grassroots community organizer and activist

Frederica Perera, Dr.P.H.  
Professor, Joseph L. Mailman School of Public Health at Columbia University

Robert Redford  
Actor; Director; Conservationist

Laurance Rockefeller  
Conservationist

Jonathan F.P. Rose  
President, Jonathan Rose Companies LLC, Affordable Housing Development Corporation

Thomas W. Roush, M.D.  
Physician

Philip (Pete) Ruegger III  
Chair, Executive Committee, Simpson, Thatcher & Bartlett

Christine H. Russell, Ph.D.  
Environmentalist; Foundation director

Wendy Schmidt  
President, The Schmidt Family Foundation; Founder, The 11th Hour Project

James Gustave Speth  
Dean, Yale School of Forestry and Environmental Studies

Max Stone  
Managing Director, D.E. Shaw & Company, L.P.

James Taylor  
Singer; Songwriter

Gerald Torres  
Bryant Smith Chair, University of Texas Law School

Elizabeth Wiatt  
Environmentalist; Founder, Leadership Council

George M. Woodwell, Ph.D.  
Founder, Director Emeritus and Senior Scientist, Woods Hole Research Center

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Professor Emeritus, Energy & Environmental Policy, University of Minnesota

Robert O. Blake  
U.S. Ambassador (*retired*)

Joan K. Davidson  
Former Parks Commissioner, NY State; President Emeritus, The J.M. Kaplan Fund

Sylvia Earle, Ph.D.  
Chair, Deep Ocean Exploration and Research, Inc.

James B. Frankel  
Attorney; Conservationist

Francis W. Hatch  
Trustee, John Merck Fund

Hamilton F. Kean  
Attorney; Conservationist

Charles E. Koob  
Partner, Simpson Thatcher & Bartlett

Burks B. Lapham  
Chair, Concern, Inc.

Jonathan Z. Larsen  
Journalist

Michael A. McIntosh, Sr.  
President, The McIntosh Foundation

Franklin E. Parker  
Advisor, The NJ Field Office of the Trust for Public Land (*retired*)

Daniel Pauly  
Director, Fisheries Centre, University of British Columbia

Nathaniel P. Reed  
Businessman; Conservationist

Cruz Reynoso  
Professor of Law, University of California, Davis

John R. Robinson  
Attorney

John Sheehan  
United Steelworkers of America (*retired*)


David Sive  
Partner, Sive, Paget & Riesel, P.C. (*retired*)

Thomas B. Stoel  
Stoel Rives (*retired*)

Frederick A. Terry, Jr.  
Senior Counsel, Sullivan & Cromwell

Thomas A. Troyer  
Partner, Caplin & Drysdale

Kirby Walker  
Independent film/video producer



# Letter to Edward Schafer, Secretary of Agriculture

May 28, 2008

*Expresses strong doubt as to the viability of eradicating the LBAM with pheromones.*

*Dr. Carey, Dr. Zalom, and Dr. Hammock are professors of entomology at UC Davis.*



DEPARTMENT OF ENTOMOLOGY  
COLLEGE OF AGRICULTURAL AND  
ENVIRONMENTAL SCIENCES  
AGRICULTURAL EXPERIMENT STATION  
TEL: (530) 752-0475  
FAX: (530) 752-1537

ONE SHIELDS AVENUE  
DAVIS, CALIFORNIA 95616-8584

May 28, 2008

Edward Schafer, Secretary of Agriculture  
U.S. Department of Agriculture  
1400 Independence Ave., S.W.  
Washington, DC 20250

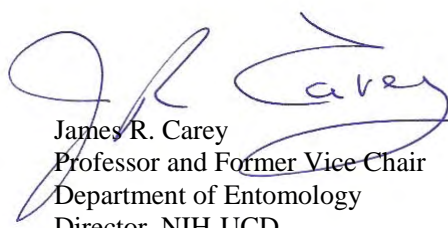
Dear Secretary Schafer:

We are writing to express our concerns with the eradication program in California directed against the light brown apple moth (LBAM) that the California Department of Food and Agriculture (CDFA) and the U.S. Department of Agriculture (USDA) launched last year in Monterey County and that is scheduled to expand to other LBAM-infested counties in mid-August. We submit that: (1) the data supporting the argument that LBAM will become a pest that is more economically important than the species of tortricid leafrollers that are already in California is unconvincing; and (2) there is no scientific evidence that using the method of mating disruption via pheromones either alone or with augmentative methods (e.g. release of natural enemies) is capable of eradicating any insect population.

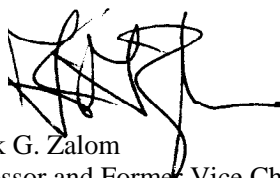
Although we do not present ourselves as experts on the biology and ecology of LBAM, as senior entomology faculty at the University of California, Davis we do claim collective expertise in areas central to the proposed eradication program including invasion biology (Carey), insect pheromones (Hammock), and integrated pest management (Zalom). In light of discussions among ourselves as well as with many of our entomological colleagues in California, we are perplexed by the claim by the USDA and CDFA that success (i.e. eliminating all LBAM populations throughout the state) using the proposed pheromone-based eradication program against LBAM in the state is achievable.

We respectfully ask that you urge CDFA Director A. G. Kawamura, his key staff members, and the USDA administrators who are directly involved with the LBAM program to revisit their decision to proceed with the proposed eradication program in California.

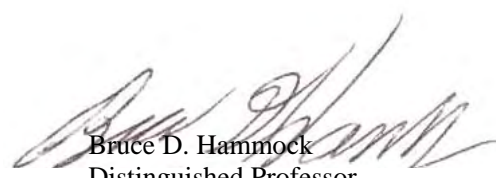
Sincerely yours,



James R. Carey  
Professor and Former Vice Chair  
Department of Entomology  
Director, NIH-UCD  
Biodemography of Aging Program  
University of California, Davis




Frank G. Zalom  
Professor and Former Vice Chair  
Department of Entomology  
Former Director, UC Statewide  
Integrated Pest Management (IPM)  
Program  
University of California, Davis



Bruce D. Hammock  
Distinguished Professor  
Department of Entomology  
UCD Cancer Research Center  
Director NIEHS-UCD Superfund Basic  
Research Program  
University of California, Davis

cc:

CDFA Director A. G. Kawamura  
Governor Arnold Schwarzenegger  
Senator Diane Feinstein  
Senator Barbara Boxer  
Congresswoman Nancy Pelosi  
Congressman Sam Farr



# Light Brown Apple Moth in California: Quarantine, Management, and Potential Impacts

July 17, 2007

*Explains the laws that make the LBAM subject to quarantine and describes the potential impact of the moth on the environment.*

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# Light Brown Apple Moth in California: Quarantine, Management, and Potential Impacts

**MARSHALL W. JOHNSON**, CE Specialist & Entomologist, Entomology, UC Riverside; **CAROLYN PICKEL**, IPM Advisor, UC Statewide IPM Program and UC Cooperative Extension, Sutter/Yuba Counties; **LARRY L. STRAND**, Principal Editor, UC Statewide IPM Program; **LUCIA G. VARELA**, IPM Advisor, UC Statewide IPM Program and UC Cooperative Extension, Sonoma County; **CHERYL A. WILEN**, IPM Advisor, UC Statewide IPM Program and UC Cooperative Extension, San Diego County; **MARK P. BOLDA**, Farm Advisor, UC Cooperative Extension, Santa Cruz County; **MARY LOUISE FLINT**, CE Specialist, Entomology, UC Davis and Associate Director, UC Statewide IPM Program; **W. K. FRANKIE LAM**, Staff Entomologist, UC Cooperative Extension, Monterey County; **FRANK G. ZALOM**, CE Specialist & Entomologist, UC Davis

In March 2007 the presence of the light brown apple moth (LBAM), *Epiphyas postvittana*, was confirmed in California by the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS). This is the first time this pest has been detected in the continental United States. It was first found in Alameda County and as of July 2007 has been found in the San Francisco Bay area counties of Alameda, Contra Costa, Marin, Napa, San Francisco, Santa Clara, San Mateo, and Solano, in the central coast counties of Monterey and Santa Cruz, and in Los Angeles County. APHIS considers LBAM to be a High-Risk pest and the California Department of Food and Agriculture (CDFA) considers it to be a Class A pest. Because of this, CDFA issued a State Interior Quarantine order restricting intrastate shipment of plant material from counties where LBAM has been found. APHIS later issued a Federal Domestic Quarantine order on May 2, 2007, with restrictions on interstate shipment of plant material.

The purpose of this publication is to help readers:

- Understand why LBAM is subject to quarantine regulations
- Understand the difference between controlling pests that are regulated under a quarantine and managing them in an integrated pest management program
- Learn about LBAM biology and identification
- Learn how to send in a sample for identification
- Become familiar with potential IPM alternatives that might be used in conjunction with eradication efforts
- Learn about possible pesticide treatments for LBAM and how to mitigate their impact on the environment
- Understand possible impacts on various sectors of agriculture and residential areas

While the document generally describes current CDFA and APHIS quarantine regulations and the LBAM situation in California, the legal and latest information, including maps of quarantined areas, can be found on the CDFA LBAM Web site ([http://www.cdfa.ca.gov/phpps/pdep/lbam\\_main.htm](http://www.cdfa.ca.gov/phpps/pdep/lbam_main.htm)).



Figure 1. Female (left) and male light brown apple moths. Used with the permission of D. Williams, State of Victoria Department of Primary Industries.

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## LBAM: A Class A Pest

Pests are classified by CDFA according to their potential to cause harm to California's agriculture and environment. Five classifications are defined. Class A pests are defined as organisms "of known economic importance subject to state (or commissioner when acting as a state agent) enforced action involving: eradication, quarantine regulation, containment, rejection, or other holding action." For definitions of all pest classes, see the PlantPestRatings.pdf file (using the search function) on the CDFA Web site (<http://www.cdfa.ca.gov>).

The A classification is designed to prevent further spread to other parts of the state and expansion of quarantine regulations to those areas and possibly the entire state. The classification also allows implementation of efforts to eradicate it from the locations where it currently occurs.

CDFA classifies LBAM as a Class A pest because

- It is potentially damaging to a wide range of plant species.
- It does not occur elsewhere in the U.S. or in most other countries.
- Were it to become established in California, quarantine restrictions and prohibitions on shipments would likely have severe impacts on agricultural industries.

Because LBAM occurs in only a limited number of locations (Australia, New Zealand, New Caledonia, Hawaii, Great Britain, Ireland), international quarantines, prohibitions against shipments, or phytosanitary certification of fresh plant products from infested locations within California have been instituted and will most likely continue to be. The primary reason for the A classification is the severe economic loss that such measures would cause industries that ship fresh plant products.

LBAM has a host range that includes many trees and ornamental species, giving it the potential to cause serious damage to natural areas and urban settings as well as to agricultural crops. Nursery products are particularly affected because many of them are LBAM hosts that are shipped outside the affected counties, to other states, and on the international market. It is not known how damaging the pest would be if it were to become established in California. LBAM is a serious pest of grapes, citrus, pome fruits, stone fruits, and kiwifruit in Australian areas that have a climate similar to that of California's Central Valley and is a major introduced pest in New Zealand, where it is favored by the cooler climate. LBAM has not become a serious pest in Hawaii and is common only at higher elevations there. If eradication of LBAM is unsuccessful and it does become established in California, quarantine restrictions and export prohibitions would likely be devastating to some commodity industries. For example, Mexico suspended importation of a number of commodities from quarantined counties on May 10, 2007. Canada implemented quarantine restrictions (similar to those of APHIS) effective June 25, 2007.

## Quarantine Regulation of LBAM

Quarantine regulations instituted by CDFA and APHIS are aimed at preventing spread of LBAM to other areas of California and to other states. The Administrator of APHIS lists as regulated those areas of the state where LBAM has been confirmed to be present, where the Administrator has reason to believe LBAM is present, or areas that cannot be separated for quarantine enforcement purposes from infested areas. **APHIS will not quarantine the entire state** if CDFA adopts quarantine regulations that are essentially the same as those imposed by APHIS, and if those regulations are considered sufficient to prevent interstate spread of LBAM. Under the quarantine regulations, there is a zero tolerance for LBAM in plant products being shipped from quarantine areas.

As of July 16, 2007, the counties of Alameda, Contra Costa, Marin, Monterey, Napa, San Francisco, Santa Clara, Santa Cruz, and San Mateo were designated as quarantined areas by APHIS and CDFA. The quarantine orders specify the areas designated as quarantined, what products are regulated by the quarantine, and what conditions must be met for movement of regulated products from the quarantine areas. **Check the CDFA Web site regularly for updates.**

- Federal Domestic Quarantine Order for LBAM ([http://www.cdfa.ca.gov/phpps/pdep/LBAM\\_FederalOrder.pdf](http://www.cdfa.ca.gov/phpps/pdep/LBAM_FederalOrder.pdf))
- State Interior Quarantine for LBAM (<http://pi.cdfa.ca.gov/pqm/manual/htm/419.htm>)

The quarantine orders affect the following plant products:

- Nursery stock
- Cut flowers, garlands, wreaths or greenery of any plants
- Trees and bushes, including cut Christmas trees
- Green waste (dead or dying plants and plant parts)
- Fruits and vegetables
- Hay, straw, fodder, and plant litter
- Bulk herbs and spices
- Any other products, articles, or means of conveyance if determined by an inspector to present a hazard of spreading LBAM

### **REGULATORY REQUIREMENTS**

Specific procedures for compliance with the LBAM quarantine are spelled out in Phytosanitary Advisory 13-2007 ([www.cdffa.ca.gov/phpps/pdep/PSA13\\_2007.pdf](http://www.cdffa.ca.gov/phpps/pdep/PSA13_2007.pdf)). This advisory includes information on the following subjects:

*Production and retail nurseries and producers of cut flowers and greenery*

- trapping and inspection
- procedures for dealing with infestations
- compliance and certification

*Green waste*

- compliance and certification

*Community gardens*

- inspection
- compliance

*Harvested fruits and vegetables*

- trapping and inspection
- compliance and certification

### **ERADICATION OR MANAGEMENT?**

APHIS has called together experts from the United States, Australia, and New Zealand to form a Technical Working Group (TWG) to advise APHIS and CDFA on steps for managing the LBAM infestation in California. The TWG has recommended that the agencies adopt a long-term goal of eradicating LBAM. Because there are no single tools or methods that can be relied upon to quickly eliminate LBAM from all infested areas, the proposed eradication program will integrate a number of strategies. It was recommended that such an eradication program include the following:

- Limiting and containing the LBAM population to its present distribution
- Monitoring to appraise changes in LBAM distribution and numbers
- Reduction of higher-density populations
- Suppression of low-density LBAM populations at the edges of quarantined areas

Quarantine restrictions are aimed at limiting and containing the LBAM populations. Keeping the pest from spreading to other areas of the state is a critical element of the program, and this will be accomplished by regular monitoring with pheromone traps, inspection, treatment of infested nursery stock or other commodities, and destruction of green waste.

Eradication programs will first be focused on the most highly infested areas including agricultural crops and residential areas. When LBAM infestations are confirmed in nurseries, regulations recommend treatment with the fast-acting insecticide chlorpyrifos before plant materials can be shipped. This material is effective at destroying eggs and larvae (it kills larvae hatching from eggs but not eggs directly). Chlorpyrifos has a long residual and some fumigant action that allows it to penetrate larval shelters.

More environmentally compatible control methods will be used to support eradication efforts by keeping LBAM numbers low across broader areas. A number of biologically-based, reduced-risk insecticides may be used in some

infested areas. These include *Bacillus thuringiensis* (Bt), spinosyns, and insect growth regulators. For example, outlying infestations are being treated with foliar sprays of Bt. Outlying infestations are defined as moth finds several miles away from other finds, and therefore are areas not likely to be naturally reinfested. The goal of treatment is to eradicate the outlying infestations before they can grow and spread. Pheromone mating disruption (PMD) is currently being used at some nurseries where LBAM has been found. Release of sterile males (SIT) and biological control are two other strategies that may become major components of the eradication or long-term management program. Successful implementation of these biologically-based tactics will require further research to adapt them for use against this pest in California. Until PMD, SIT, and biological control tactics can be developed and implemented, more traditional pest management strategies, such as the application of fast-acting organophosphate and pyrethroid insecticides, will be used to reduce LBAM populations in those areas with higher numbers of the pest.

Research on LBAM management strategies in California will be difficult under quarantine regulations. To test control techniques, researchers must have populations or laboratory colonies of a pest that the state is trying to eradicate. It is unlikely that pesticide testing, for example, would be possible in facilities established for the study of quarantine pests because of the possibility of the pesticides affecting other organisms within the facility. Unfortunately, research results from other locations such as New Zealand, Australia, and Hawaii may not be applicable to California conditions. However, some testing may be possible in locations with the highest populations of LBAM, before intensive area-wide eradication treatments begin in those areas. APHIS will be conducting insecticide trials in Australia, beginning in July.

Following recommendations of the TWG, APHIS and CDFA are formulating traditional IPM alternatives, such as applying materials effective on the life stages present, to suppress LBAM populations in areas not yet under intensive eradication, until intensive eradication can be implemented.

A Section 18 emergency exemption has been obtained for Isomate LBAM Plus for pheromone mating disruption to manage LBAM and for eradication. This exemption will allow for immediate use of this potentially effective, low-risk management tool in the eradication program.

If APHIS and CDFA decide LBAM can no longer be eradicated, then management of the pest will move to a traditional IPM program, which would probably include pheromone mating disruption, monitoring and use of a degree-day model to target young larvae with less-toxic materials, and biological control (possibly *Trichogramma* releases and importation of parasites from Australia).

## Biology and Identification of the Pest

LBAM is a tortricid leafroller moth native to Australia. It is now established in New Zealand, New Caledonia, Great Britain, Ireland, and Hawaii. It has a broad range of plant hosts, including landscape trees, ornamental shrubs, fruit and certain vegetable crops. It is known to feed on 250 plant species in over 50 families with preference for plants in the aster (Asteraceae), legume (Fabaceae), knotweed (Polygonaceae), and rose (Rosaceae) families. LBAM has been reported as a pest on apple, pear, peach, apricot, citrus, persimmon, avocado, walnut, grape, kiwifruit, strawberry, caneberries, and cole crops. It may also infest oak, willow, poplar, cottonwood, alder, pine, eucalyptus, rose, camellia, jasmine, chrysanthemum, clover, plantain, and many other plants. In California it may encounter additional hosts it was not previously known to infest.

LBAM is found throughout Australia but it does not survive well at high temperatures and is a more serious pest in cooler areas with mild summers. The pest performs best under cool conditions (mean annual temperature of approximately 56°F) with moderate rainfall (approximately 29 inches) and moderate-high relative humidity (approximately 70%). Hot, dry conditions may reduce populations significantly.

LBAM is capable of flying only short distances to find a suitable host. Most moths fly no further than 330 feet (100 meters), but some may fly as far as 2000 feet (600 meters). Dispersal is most likely by movement of infested nursery plants or green waste, and on equipment and containers.

## DESCRIPTION

Like other tortricids, LBAM adults hold their wings over their abdomen in a bell shape when at rest and have protruding mouthparts that resemble a snout. The antennae are simple, not feather-like. The length of a resting moth is about half its wingspan. Adult size may vary during the season, with larger individuals present during cool, wet months and smaller individuals present during warm, dry months. The length of the forewing (front wing—the one on top when the moth is at rest) in the male is approximately 0.3 inch (8 mm), with a range of 0.23 to 0.4 inch (6–10 mm), and in the female the length is 0.27 to 0.5 inch (7–13 mm).

There is a considerable variation in the coloration of the wings, especially on the males (Fig. 2). The basal half (closest to the head) of the male forewing may be light brown (Fig. 2A) to pale yellow (Fig. 2D), while the distal half (farthest from the head) is reddish-brown. In strongly marked forms the distal half of the forewing may vary from reddish-brown (Fig. 2A) to blackish with purplish mottling (Fig. 1), and the basal half is sparsely speckled with black. In some males this two-tone wing coloration of the forewings may be absent. Instead, they are light brown with a slightly darker oblique marking (Fig. 2B, 2E). In the female, forewing color varies from uniform light brown, with almost no distinguishing markings or with a dark spot in the center front of the folded wings, to the typical oblique markings of the male but with less contrast between the basal and distal halves. Hind wings (back wings) of both sexes are pale brown to gray, either uniform in color or mottled with wavy dark brown markings.

Males have an extension of the outer edge of the forewing called the costal fold that runs from the base of the wing to two-fifths of the length of the wing edge (Fig. 3). This is an expanded part of the wing that folds up over the front

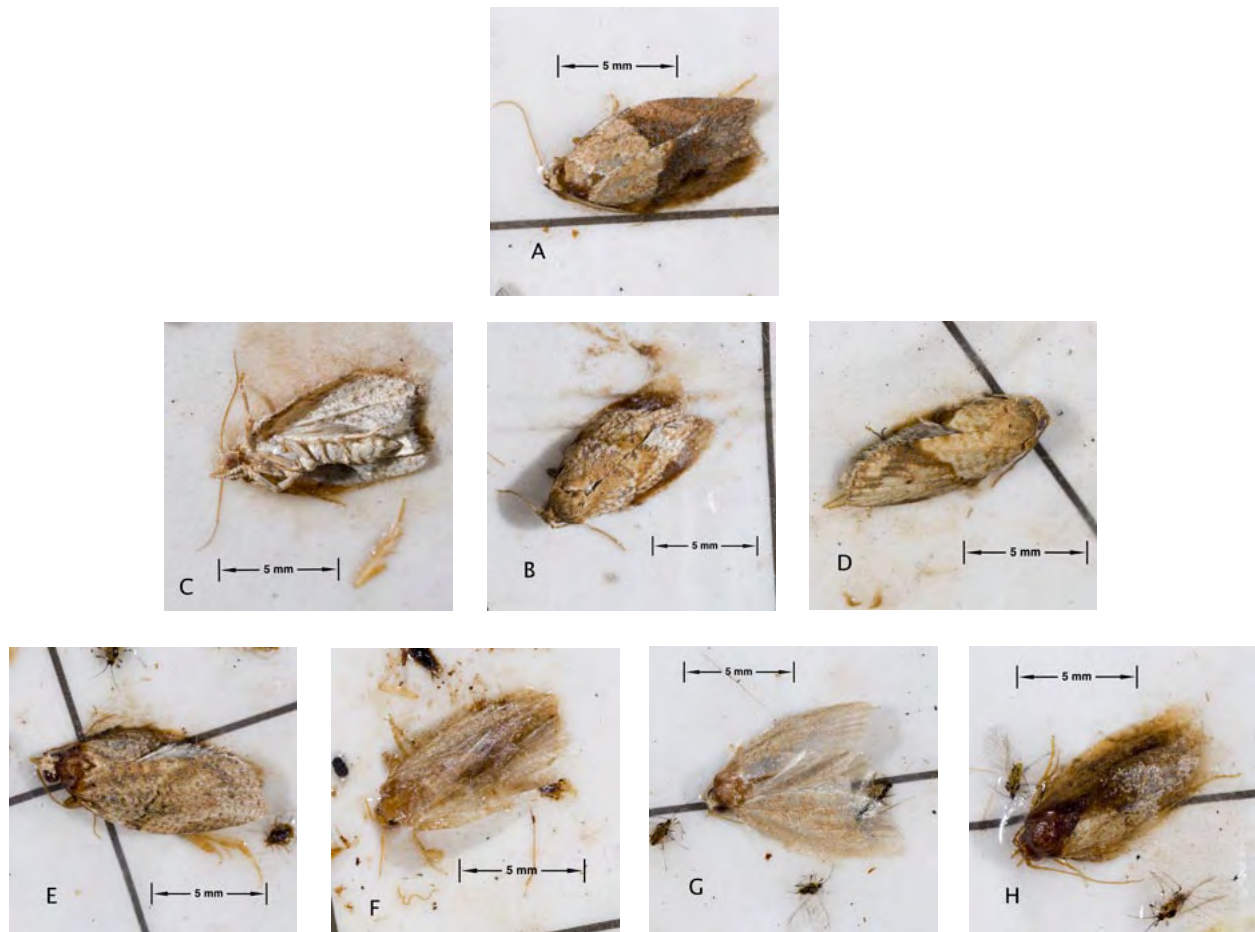


Figure 2. The wing color pattern of LBAM adults, such as those shown here in pheromone traps, can be highly variable. Photos by J. K. Clark.

edge of the wing as a flap. Females do not have the costal fold.

The eggs are white to light green, broadly oval, flat with a pebbled surface, and are laid slightly overlapping each other. The egg mass is covered with a greenish transparent coating (Fig. 4). An egg mass may contain from 2 to 170 eggs, but typically has 20 to 50 eggs. Egg masses are deposited on the upper surface of host leaves and occasionally on fruit and young stems. As the eggs develop, they change to paler yellow-green. Immediately prior to hatching, the dark head of the developing caterpillar is visible.



Figure 3. The costal fold along the basal two-fifths of the wing of the male LBAM helps distinguish this species from other tortricid moths. Photo by J. K. Clark.



Figure 4. Newly laid LBAM eggs are covered with a greenish, transparent coating. Photo by A. Loch, © 2007 State of New South Wales Department of Primary Industries. Used with permission of A. Loch.

The newly hatched larva is pale yellow-green, 0.06 to 0.08 inch (1.5–2 mm) long and has a dark brown head. There are 5 to 6 larval instars or stages. Mature larvae range from 0.4 to 0.7 inch (10–18 mm). The head is light yellow-brown, and the prothoracic shield (segment behind the head) is light greenish-brown with no dark markings (Fig. 5). The body is medium green with a darker green central stripe that may continue to the prothoracic shield; larvae may also have darker stripes on both sides. The hairs on the body are whitish. The thoracic legs are the same color as the head, but paler, and are also unmarked. In the anal region there is a greenish anal comb—a comb-shaped structure at the tail end of the larva. An overwintering larva may have a darker head and prothoracic shield.

The pupa is found in a thin-walled silken cocoon between two leaves webbed together. The pupa turns from green to brown as it matures (Fig. 6). It is dark reddish-brown and 0.4 to 0.6 inch (10–15 mm) long.

#### LIFE CYCLE

A degree-day model used for predicting LBAM development indicates that there will most likely be 2 generations a year in the central and north coast areas of California, and 3 or 4 generations a year in the Central Valley and southern California. In Australia, New Zealand, and the British Isles, generations overlap. LBAM does not have a winter resting stage (diapause). Cold winter temperatures slow larval development considerably. Thus, the pest overwinters as a second to fourth instar larva feeding on herbaceous plants, on the buds of deciduous trees or shrubs, on mummified fruit, and other plant material. Larvae may survive for up to 2 months in the winter without feeding.

Adult moths emerge after one to several weeks of pupation and mate soon after emergence. They stay sheltered in the foliage during the day, resting on the undersides of leaves. Moths fly 2 to 3 hours after sunset and before daybreak. Females begin to lay eggs 2 to 3 days after emerging, depositing eggs at night. The majority of the eggs are laid between day 6 and 10 after emergence, but females can continue to lay eggs for 21 days. Females prefer to deposit their eggs on smooth leaf surfaces. Females usually lay a total of 120 to 500 eggs, but can lay up to 1500 eggs.

Males disperse farther than females. Adults are less likely to leave areas with high-quality hosts. Adult life span is 2 to 3 weeks, with longevity influenced by host plant and temperature.

An egg takes from 5 to more than 30 days to hatch, depending on temperature, with an average of 5 to 7 days at 82°F. The lower and upper developmental thresholds for LBAM are 45° and 88°F, respectively. Larvae emerge from eggs after 1 to 2 weeks and spread out in search of suitable feeding sites. When a larva finds a feeding site, it forms a silken shelter near the mid-rib on the underside of the leaf and begins to feed (Fig. 7). Second and later stages feed



Figure 5. Mature LBAM larva. Used with permission of D. Williams, State of Victoria Department of Primary Industries.



Figure 6. Pupa of fruit tree leafroller. The pupae of all leafrollers, including LBAM, appear virtually identical. Photo by J. K. Clark.



Figure 7. All leafroller larvae use webbing to roll leaves into shelters. Photo by J. K. Clark.

between two to several leaves webbed together, a leaf webbed to a fruit, or in the center of a cluster of fruits. The larvae feed within these shelters, and they may feed on fruit when it touches a leaf. Larvae on fruit are most likely to be found near the calyx. When disturbed they wriggle violently, suspend themselves from a silken thread, and drop to the ground where they feed on groundcover hosts. Larval development can take from 3 to 8 weeks, depending on temperature.

Pupation is completed within the shelter made from rolled-up leaves. The pupal stage lasts 1 to 3 weeks. Completion of the entire life cycle requires 620 degree-days above 45°F.

### MONITORING

An effective sex pheromone for attracting male LBAM is commercially available. It is used in delta traps to detect the presence of the moth. These pheromone traps detect and monitor the male moths and are deployed at one per 5 acres in commercial crops, with at least one in every field no matter how small.

LBAM larvae are present for most of the year, either in trees or shrubs or on herbaceous plants. To detect the eggs and larvae, examine leaves. Look for the characteristic webbing at the mid-rib vein on the underside of leaves and between leaves. At flowering, check blossom clusters for webbing and larvae. In trees they are more commonly found in the lower half and central part of the tree, closer to the trunk. In shrubs they are found mostly on the developing leaves on branch terminals. When fruit is present, examine clusters of fruit by separating and looking between the fruit. In the winter, check the ground cover and herbaceous plants for webbing. Look for larvae in fruit mummies.

### DAMAGE

Like other leafroller tortricids, LBAM feeds from within the sheltering nest it constructs. Foliar feeding is usually considered minor in fruit crops, though it might be of economic importance on ornamentals. On fruit crops the primary concern is fruit damage. Larvae remove the outermost layers of the fruit surface as they feed. Superficial feeding injury to the fruit is typically caused by later immature stages. Young larvae may enter the interior of a pome fruit through the calyx. They can cause internal damage to stone fruits as well. Minor feeding damage can take the form of pinpricks or “stings” on the fruit surface. In grape, larvae can cause extensive loss of flowers or newly set berries in the spring. Later in the season, grapes can be severely damaged by larvae feeding among the berries, allowing mold organisms to enter. In citrus, larval feeding causes fruit drop or halo scars around the stem end of fruit. In crops such as kiwifruit, plum, citrus, and pome fruit, the maturing fruit produces a layer of corky tissue over the leafroller damage. Buds of deciduous host plants are vulnerable to attack in the winter and early spring. Conifers are damaged by larval activity such as needle tying, chewing of buds, and boring into stems. In tree nurseries, damage to terminal buds on seedlings and saplings can cause multiple or crooked leaders.

## IDENTIFICATION

Positive identification of LBAM can be made with certainty **only** by examining an adult.

The most efficient and reliable way of obtaining male adults is with the use of LBAM pheromone traps. The pheromone is specific for this pest and attracts males. There are many native tortricids that can be confused with LBAM. If you find a tortricid moth in a LBAM pheromone trap take it to your county agricultural commissioner's office for positive identification.

LBAM are rarely attracted to pheromone traps that target other species of leafroller. Other leafroller pheromone traps, yellow sticky cards, and McPhail traps do not effectively detect LBAM.

Suspect larvae should be delivered to the county agricultural commissioner for proper identification. Some specimens of non-LBAM larvae will have morphological characters that are never present in LBAM larvae, and can therefore be ruled out as possible LBAM. Otherwise, LBAM larvae cannot be reliably identified using morphological characters with our current knowledge. There are several reasons for this. In California there are many native tortricids, and while there is a key for identifying the adult tortricids of California, there is no comprehensive key for the larvae. There is a key of the tortricid larvae of New Zealand that includes LBAM, but it does not include native species of California and **cannot** be used to identify leafroller larvae in California. Furthermore, available descriptions of larvae are frequently made from specimens that have been preserved in alcohol, causing some characters to be lost. Lastly, the more reliable larval characters are found in the larger immature stages, but suspect LBAM larvae of all ages are being collected and submitted for identification. Work is under way to improve larval diagnostics based on morphological characters in fresh samples.

Molecular diagnostics based on PCR amplification of mitochondrial DNA were recently developed for immature specimens and are now being used to reliably identify suspected LBAM larvae. Larvae are screened using morphological characters, then DNA patterns from suspected LBAM larvae are compared to patterns of known LBAM DNA. If the patterns match, suspect larvae are considered likely LBAM. Absolute certainty is not possible because there are still many California tortricids whose DNA has not been sequenced so the reference database is incomplete. Minor genetic variation has been noted among LBAM specimens, but it is not yet known whether this is normal population variation or an indication of multiple introductions.

## HOW TO SEND A SAMPLE FOR IDENTIFICATION

Suspected LBAM larvae should be brought **alive** to the county agricultural commissioner's office. If possible, bring the live larvae inside the webbed nests of rolled-up leaves, flowers, or fruit clusters. For viewing larval morphological characters, the specimen has to be a late instar and must have been properly preserved by experts. County agricultural commissioner's offices have the equipment and expertise to do this. Moths caught in pheromone traps should be submitted still in the traps.

## Potential IPM Alternatives

The current long-term goal is to eradicate LBAM from California. However, no single control technique currently exists that can be practically, safely, and effectively implemented over the entire LBAM-infested area. Because of this, current recommendations to successfully eradicate LBAM are multi-phase in nature.

Eradication efforts using available technologies (e.g., pheromone mating disruption) will focus initially on specific localities such as extremely infested areas. If initial eradication attempts are successful and deemed feasible for expansion, then additional LBAM infestations will be eradicated as quickly as conditions, technology, logistics, and fiscal support permit. While eradication attempts are under way, it is important that LBAM infestations throughout the infested range do not continue to increase in size and expand to uninfested areas such as the Central Valley and southern California. Pest management tactics that rely on more environmentally compatible methods are desirable to support the eradication effort by keeping LBAM at low numbers across agricultural, urban, and natural areas.

Fortunately, the biology and ecology of LBAM make it susceptible to a variety of potential control methods that are

less environmentally harmful and more socially acceptable than highly toxic, broad-spectrum insecticides such as chlorpyrifos. However, these alternatives do not generally act as quickly (i.e., less than 72 hours) as the insecticides they replace (organophosphates, carbamates, pyrethroids). Some alternative controls developed in Australia and New Zealand, such as pheromone mating disruption, will have to be modified for California conditions while others (e.g., sterile insect technique, augmentative biological control) will require various levels of development, experimentation, and validation to make them functional and effective.

Lastly, the effectiveness of these alternative controls may be influenced by the manner in which they are implemented. Mating disruption and sterile insect release will be more successful when applied over large areas (e.g., square miles). Classical biological control is an area-wide management tactic. Also, these large-scale approaches generally require government support for successful development and implementation. In contrast, reduced-risk chemicals, insect pathogens or their by-products (e.g., *Bacillus thuringiensis* ssp. *kurstaki*), and augmentative releases of natural enemies (e.g., *Trichogramma* egg parasitoids) can be effective on a small scale, such as acres, and implemented with minimal effort. Discussion of the availability and effectiveness of these management approaches follows.

### SMALL-SCALE APPROACHES

**Reduced-Risk Pesticides.** These compounds offer an alternative to organophosphate, carbamate, and pyrethroid insecticides that are potentially a human health risk, an environmental threat, or highly disruptive to beneficial species such as bees or biological control agents. Some may meet requirements for organic production. Only those compounds that have shown good effectiveness against LBAM in Australia and New Zealand are discussed below. Because timing spray applications to target susceptible life stages is highly important for control, the validation and adaptation of a LBAM phenology model under California conditions will be important for predicting generation cycles.

*Insect growth regulators (IGRs).* This group of compounds is derived from naturally occurring hormones that insects use to trigger molting events during their development from egg to adult. Thus, they work only on the immature stages. These compounds may be applied to the foliage, and timing of applications is important to contact the susceptible life stages. Tebufenozide is active against larvae and may be applied to crops using the formulation Confirm 2F; a formulation for ornamentals is pending registration. Methoxyfenozide (Intrepid 2F) is active against both eggs and larvae, but is registered for use only on some crops. For methoxyfenozide to be effective on eggs, they must contact the chemical residue as they are laid. Because leafroller eggs are laid in overlapping layers, not all eggs will contact the chemical, so control of eggs is not complete. Care must be taken when using this product around bodies of water where runoff may impact aquatic invertebrates.

*Spinosad.* This insecticide is produced by a fermentation process using the microorganism *Actinomyces spinosa*. It is applied as a foliar spray at low field rates, targets only larvae, and is most effective when eaten by the larvae. It is available under various trade names including Success and Entrust (organic formulation) for crops and Conserve for nursery, ornamental, and greenhouse plants. Although generally safe for predators, it may impact hymenopteran parasitoids (wasps) that are useful biological control agents.

*Insect pathogens.* Commercially available insect pathogens for LBAM suppression are limited to *Bacillus thuringiensis* ssp. *kurstaki* (Bt). This product is effective only on larvae. The formulation is mixed with water and applied to infested plants. The Bt residue must be eaten by the larvae; contact alone will not kill LBAM larvae. Because Bt must be ingested, the leaf-rolling or leaf-tying behavior of the insect may help protect the larva from this material. Bt is most effective on young larvae. Nuclear polyhedrosis virus (NPV) that infects LBAM does exist, but it is not commercially available. Development is necessary to improve the mass production methods for the NPV. Codling moth granulosis virus does not appear to be effective against LBAM.

**Augmentative Biological Control.** This approach relies on the use of beneficial insects (predators or parasitoids) that are typically mass produced and released in the infested areas at rates that vary from hundreds to millions of individuals per acre. Predators attack and quickly devour their prey either by eating the pest (e.g., ladybugs) or sucking out the body liquids (e.g., lacewings). Parasitoids (or parasites) are insects that deposit their eggs inside the body

or on the surface of their host insect, and the hatched immature insect feeds on the host to complete its development to the adult stage. Parasitoids do not immediately kill their host; death may require several days or more. Many effective parasitoids are tiny wasps that can barely be seen by the unaided eye. *Trichogramma* wasps are some of the smallest insects known, and they attack the egg stage of their hosts. Augmentative releases may be made in conjunction with the use of reduced-risk insecticides if timed correctly.

*Predators.* Presently, no information is available on using mass-reared predators for LBAM suppression.

*Parasitoids.* The only parasitoids that may be useful are the *Trichogramma* egg parasitoids. These biological control agents parasitize the eggs of their host insects and the *Trichogramma* larvae complete their entire developmental cycle (egg to adult) within the host egg. *Trichogramma carverae* is used in augmentative releases in some crop systems in Australia, but is not present in the U.S. Various *Trichogramma* species are commercially available in the U.S., but their effectiveness in suppressing LBAM is unknown. Although *Trichogramma* appear to have a wide preference for the various moth species they attack, their searching behavior for eggs may better define which species are attacked. Some *Trichogramma* prefer to search for eggs in tree canopies while others prefer plants that are low to the ground. No guidelines are available for *Trichogramma* use in inundative releases against LBAM in California. Research is needed to determine the preference of the wasps for LBAM eggs, the numbers of wasps required to effectively suppress LBAM in a locality, the optimal timing of releases, and the types of crops (e.g., vegetable crops, vineyard, orchard, nursery, etc.) in which releases would be effective.

#### AREA-WIDE APPROACHES

These approaches may be beyond the scope of individual growers or groups and usually need significant financial and logistic support to be successful. They typically have large-scale government and private industry involvement.

**Pheromone Mating Disruption.** Female moths commonly emit chemicals known as pheromones to attract males to them for mating. Many pheromones have been chemically analyzed and can be synthetically produced. Some pheromones are highly specific, attracting only one species, and others are more general in nature, attracting more than one insect species. Pheromone specificity is gained by varying mixtures of the chemical components. LBAM pheromone has two key components. **Both components must be present** for the material to be highly attractive to LBAM males and effective as a mating disruption tool. Man-made pheromones are used with traps to monitor moth activity, for trapping moths for control, and for interfering with the ability of male moths to locate females for mating. As greater numbers of females go unmated within an area, fewer fertilized eggs will be laid to produce a new generation of offspring. Mating can be disrupted by saturating the air with large quantities of pheromone, thereby interfering with the ability of males to follow aerial scent trails to emitting females.

Many factors influence the success and cost of mating disruption. These include access to enough pheromone to saturate targeted areas; a practical and inexpensive method to dispense pheromone over long periods such as weeks or months; correct timing of the pheromone release; the inability of affected males to locate females within the treated area; low densities of the target pest; and low wind speeds.

Mating disruption is commonly used in California fruit orchards for peach twig borer, oriental fruit moth, and codling moth. Mating disruption has not worked well with various leafroller species. However, in Australia LBAM has been managed in citrus, grapes, and other crop systems using mating disruption. Research is needed to determine if LBAM mating disruption would be successful and feasible in California. Currently, novel strategies to employ synthetic pheromones for LBAM suppression are being investigated in Australia and New Zealand, and these may be available in the future for California.

**Sterile Insect Release.** Sterile insect release (SIT) is commonly used to eradicate Mediterranean fruit fly (Medfly) infestations in California. Basically, millions of Medfly individuals are reared in colonies and irradiated to make them sterile. These are then released in areas where Medfly infestations have been found, and sterile males mate with wild females and prevent the females from laying viable eggs. This technique may hold promise for LBAM if mass rearing systems can be developed to produce the needed numbers of LBAM males to sterilize for release. These studies are currently under way.

**Classical Biological Control.** This tactic is commonly employed when

- An invasive species has established in a new location.
- It is extremely difficult or expensive to control due to various factors (e.g., high levels of pesticide resistance, significant economic damage to low-value crops or natural ecosystems, large plant host range and presence in unmanaged land, or pesticides are ineffective because of the organism's biology).
- Effective natural enemies exist in other locations where the organism is found in low numbers.

If these criteria are met, natural enemies may be collected in the former home of the invasive species and imported to the new location and released to control the invasive species. Highly successful biological control introductions can lead to complete control of the target pest such that the pest no longer causes economic injury. Although the target pest may be reduced to very low numbers, it will not be eradicated from the area. Additionally, imported natural enemies may impact organisms that are not the intended target. Because of this, natural enemies that may be considered for a classical biological control program must undergo tests, which may take several years, to determine whether they attack more than one insect species. If the candidate natural enemy does not target a very limited range of hosts or prey, there is a lesser chance that it will be approved for release in the new location.

In Australia, as many as 25 different parasitoid species have been reared from LBAM collected in the field. However, there apparently are no “silver bullet” species that are well recognized for suppressing LBAM populations across a wide variety of crops. Because of this, the success of a classical biological control program may be doubtful if eradication is the goal. The resources that would be directed towards a classical biological control program would probably be better used in developing and refining effective eradication techniques.

One advantage in California is that there are numerous leafroller species established within the state and many of these have effective parasitoids (e.g., *Cotesia*, *Exochus*, *Macrocentrus*, *Nemorilla*, *Trichogramma*) and predators (spiders, minute pirate bug, lacewings, *Phytocoris* bugs), including some in the same genera (e.g., *Exochus*) as those found in Australia. It is highly probable that some of the California native predators will expand their prey ranges to include LBAM eggs, larvae, and pupae. However, this may require a few years to occur, given the time required for these natural enemies to discover and exploit LBAM infestations across the range of potential habitats (urban, natural, agricultural).

## Pesticides for Controlling LBAM

Listed below are examples of regulated products for control or prevention of LBAM at nurseries and crop production areas. Establishments where LBAM infestation has been detected must follow procedures outlined in Phytosanitary Advisory 13-2007. **(Check the CDFA LBAM Web site frequently for updates.)** Users must follow all label restrictions. Many active ingredients are in multiple products, each with specific site recommendations. If your crop (site) does not appear, alternative products may be available for your situation. Search products based on multiple categories (site and chemical code) at [www.cdpr.ca.gov/docs/label/m4.htm](http://www.cdpr.ca.gov/docs/label/m4.htm).

**Table 1. LBAM Regulated Treatments for Nurseries and Host Crops**

Source: California Department of Food and Agriculture (June 25, 2007)

Active Ingredient	Product	Sites	Target Life Stage	EPA Reg No
BT	Crymax Lepinox	Ornamentals & crops	Larvae	70051-86 70051-89
	Dipel DF Pro	Ornamental Organic		73049-39
	Dipel DF	Crops Organic		73049-39
Carbaryl	Sevin 4F	Ornamentals & crops	Adults <sup>1</sup>	264-349-ZB
Carbaryl	Sevin SL	Ornamentals & crops	Adults <sup>1</sup>	432-1227-ZA
Carbaryl	Sevin Brand 80S	Crops	Adults <sup>1</sup>	264-316-ZC
Chlorpyrifos	DuraGuard ME	Ornamentals & greenhouses	Eggs <sup>2</sup>	499-367-ZA
	Chlorpyrifos Pro 2 Chlorpyrifos Pro 4	Ornamentals		51036-152-AA 51036-154-AA
	Chlorpyrifos 4E AG Dursban 2.5G Dursban 4E <sup>3</sup> Dursban 50W Dursban Pro Prentox Dursban 4E	Greenhouses		66222-19-AA 62719-276-AA 62719-11-AA 62719-72-AA 62719-166-ZA 655-499-AA
Deltamethrin	Suspend SC	Ornamentals	Adults	432-763-ZB
Dimethoate	Clean Crop Dimethoate 400	Ornamentals & crops		34704-207-AA
Lambda-cyhalothrin	Warrior with Zeon	Crops	Larvae	100-1112-AA
Methoxyfenozide	Intrepid 2F	Crops	Larvae <sup>4</sup>	62719-442-AA
Phosmet	Imidan 70 W Imidan 70WP	Ornamentals	Eggs, larvae	10163-169-ZA 10163-169-AA
		Crops		
Spinosad	Conserve Entrust	Ornamentals	Larvae	62719-291 62719-282
		Crops		
Tebufenozide	Confirm 2F	Ornamentals & crops	Larvae	62719-420

Footnotes added by University of California authors. More information on use of these pesticides can be found in the pesticide treatment tables for leafrollers in various crops in the *UC IPM Pest Management Guidelines* at <http://www.ipm.ucdavis.edu/PMG/> or by searching the UC IPM Web site for the active ingredients.

<sup>1</sup> Carbaryl is active against leafroller larvae.

<sup>2</sup> Kills first instar larvae as they chew through their egg shells when hatching. Also kills older larvae and adults. These chlorpyrifos products are registered for use on LBAM host crops:  
Lorsban 50W (62719-39-AA), Lorsban-4E (62719-220-ZA), Lorsban-75WG (62719-301-AA), Lorsban 15G (5481-525-AA).

<sup>3</sup> Dursban 4E under review at EPA for cancellation.

<sup>4</sup> Does not control eggs completely because the overlapping nature of the eggs prevents contact of the pesticide with all the eggs in an egg mass.

## MITIGATING MEASURES TO REDUCE THE IMPACT OF PESTICIDES ON THE ENVIRONMENT

Several of the insecticides available for LBAM management, including spinosad, *Bacillus thuringiensis* ssp. *kurstaki*, and the IGR methoxyfenozide (Intrepid), have minimal negative impacts on human health and the environment, including water quality. If mating disruption technology is implemented for this pest, it is also likely to provide an environmentally sound approach.

Chlorpyrifos (Lorsban, Dursban) is labeled for use on ornamental nursery stock in nurseries in California. Chlorpyrifos is an option for treating nursery stock in nurseries where LBAM immature life stages have been found. Chlorpyrifos controls all stages of the pest including hatching eggs and has a longer residual than the reduced-risk products mentioned above. Chlorpyrifos must be used with care because of its potential for contaminating surface water. This material is **not** being used for eradications in urban areas.

If using a broad-spectrum pesticide (organophosphate, pyrethroid, carbamate), consider management practices that reduce pesticide movement off-site and protect other sensitive areas:

- Identify and take special care to protect sensitive areas, for example waterways, riparian areas, or residential or school buildings, near your site.
- Choose sprayers and application procedures that keep pesticides on target.
- Install an irrigation recirculation or storage and reuse system.
- Use drip rather than sprinkler or flood irrigation.
- If using overhead irrigation, do not irrigate pesticide-treated foliage until treated foliage dries.
- Limit irrigation to amount required using soil moisture monitoring and evapotranspiration measurements.
- Use pulsed irrigation—several shorter irrigation runs rather than one long run to allow soil to absorb water between runs.
- Consider vegetative filter strips or ditches.
- Redesign inlets into tailwater ditches to reduce erosion. Ditches should not be lower than furrows.

## Impacts on Specific Industries and Situations

*The quarantine requirements for LBAM will be updated regularly by the CDFA. For the latest information, check the CDFA LBAM Web site listed below.*

### CURRENT IMPACT ON NURSERIES AND ORNAMENTALS

The majority of LBAM detections on agricultural lands in the infested areas have been in production and retail nurseries located near urban areas, and therefore these nurseries are heavily impacted by LBAM quarantine regulations. Since nursery stock is often grown in one location and shipped or moved to distant locations, it is easy for LBAM and other pests to be moved along with the nursery stock. In addition, green waste such as vegetative clippings, leaf litter, or propagative materials might harbor LBAM and be moved inadvertently off-site.

Retail nursery operators may have a particularly complicated set of burdens and associated decisions to make with a LBAM infestation. Often retail nurseries do not possess the spray equipment necessary for widespread application of a pesticide as would be required by a quarantine-mandated pesticide application. In that case, a private pest control company might have to be hired to make the pesticide application. Retail nurseries must be closed for business during the pesticide application, the restricted entry period, and until reinspected and found free of LBAM. In addition, retail nurseries usually have a very wide range of edible and ornamental material further complicating the selection of a registered pesticide.

**Quarantine Requirements.** All nursery operations within quarantined counties must follow quarantine requirements. Current maps of quarantined areas can be found on the CDFA LBAM Web site ([http://www.cdfa.ca.gov/phpps/pdep/lbam\\_main.htm](http://www.cdfa.ca.gov/phpps/pdep/lbam_main.htm)). Nursery material affected by the quarantines includes:

- Production and retail nursery stock, cut flowers, garlands, wreaths, greenery of any plants
- Garlands, wreaths, greenery, and cut Christmas trees
- All green waste

Details of current quarantine requirements for trapping, inspection, treatment of infestations, and certification are spelled out in Phytosanitary Advisory 13-2007, available on the CDFA LBAM Web site. **Check the Web site frequently for updates.** A summary of the current requirements is given here; because quarantine requirements may be modified, check the CDFA site for updated information or talk with your county agricultural commissioner's office.

- A. For nurseries within quarantined zones or within 1.5 miles of a location where LBAM was detected
- **Trapping:** one trap per 5 acres with a minimum of one trap, inspected every two weeks
  - IPM program using treatments effective against LBAM
  - **Inspections:** biweekly inspection of all plants to be moved interstate and monthly inspection of all plants to be moved intrastate
  - **Infestations:** treatment with material effective on LBAM eggs or treatment using a larvicide and safeguarded in an approved enclosure, LBAM trapping (interstate shipments only), and 100% re-inspection
  - **Certification:** All shipments must be certified by attaching a copy of a completed USDA shield from a signed compliance agreement. Shipping nurseries and growing locations may enter into a compliance agreement with county agricultural commissioner. Retail nurseries must be issued a compliance agreement requiring them to provide information about LBAM to customers who purchase plant material.
- B. For nurseries in quarantined counties but outside the quarantine zones AND more than 1.5 miles from any LBAM detection sites
- Interstate shipping nurseries and growing locations: LBAM trapping and one-time visual inspection of all nursery stock. Compliance certificate from county agricultural commissioner.
  - Retail nurseries that don't ship interstate: one-time visual inspection of all nursery stock.
- C. If LBAM larva, pupa, or egg mass is found on a nursery premises within quarantined zones or within 1.5 miles of a location where LBAM was detected, all plants must be placed on hold and one or more of the following options implemented. In all cases, treated plants must be 100% inspected and found free of LBAM before release.
- Treat all plants with product effective on LBAM eggs or a specific product if required by the local county agricultural commissioner.
  - Treat all plants to be moved within 10 days with product effective on LBAM larvae. Hold plants in approved enclosure for 10 days with LBAM traps. Check with your country agricultural commissioner to determine what is considered an approved enclosure.
- D. If larva, pupa, or egg mass suspected of being LBAM is found on a nursery premises in a quarantined county but outside the quarantine zones AND more than 1.5 miles from any LBAM detection sites, all plants must be placed on hold and one of the following options implemented. Less than the entire nursery may be held if inspectors determine the infestation can be attributed to an incoming shipment.
- Follow procedures outlined in C.
  - Treat infested plants with product effective on LBAM eggs, followed by 100% re-inspection. Hold all other plants for the duration of one complete LBAM life cycle with detection trapping.
- E. All green waste transporters and receivers within the quarantined counties must be issued a compliance agreement by the county agricultural commissioner. Receivers outside of quarantined counties must request a departmental permit from CDFA's permit office. Compliance agreements for green waste transporters and receivers are parallel to those in use for the *Phytophthora ramorum* quarantine. All green waste leaving quarantined areas must be accompanied by quarantine certification. A copy of the compliance agreement in the vehicle meets this requirement.

If possible, incoming shipments, especially from known LBAM-infested areas, should be isolated in a quarantine area away from production and inspected and possibly treated prior to moving them into the production area.

**Inspection and Treatment Recommendations.** Inspect nurseries every 3 days or at least twice per week. Randomly check 10 to 50 plants per variety for the green leaf-rolling caterpillar. Look for webbed young leaves and white to pale green overlapping masses of LBAM eggs on the upper surface of leaves. Check leaves at branch terminals in particular. The preferred egg-laying sites are the leaves, especially young leaves, although eggs can occasionally be found on fruit and tender young stems. Larvae construct silken shelters on the underside of leaves. Older larvae roll together leaves and buds; look for rolled leaves held together with webbing. Young larvae are tiny and are often difficult to see. Look for webbing in leaves hiding green caterpillars.

If you find eggs or larvae that you suspect are LBAM, place the **live** specimens in a vial or small jar and send them to your county agricultural commissioner's office for identification. There are many species of leaf-rolling moths in the area, and they are very similar in size and appearance.

If any of the collected specimens are confirmed to be LBAM, all plants in the nursery are subject to quarantine action, which may include treatment, a holding period, and re-inspection. Quarantine action must take place before plants can be shipped from the infested nursery. Chlorpyrifos has been determined to have efficacy against eggs and larvae. Treatment with chlorpyrifos may be selected as the quarantine action by growers wishing to move their plants from the nursery as soon as possible.

After the expiration of the restricted entry interval, the nursery must be inspected by the local agricultural commissioner. If the inspection is negative for LBAM, the nursery can adopt its usual integrated pest management program.

However, if LBAM larvae are found during the re-inspection, a second treatment of the plants where the larvae were found must be made until a negative result is attained. Furthermore, after the last treatment that yields negative LBAM, another re-inspection of the nursery will be made as determined by the agricultural commissioner and CDFA.

A table listing states requesting pre-shipment notification of nursery stock from quarantined areas can be found on the CDFA Web site: ([http://www.cdfa.ca.gov/phpps/pdep/LBAM\\_PreshipmentNotification.pdf](http://www.cdfa.ca.gov/phpps/pdep/LBAM_PreshipmentNotification.pdf))

If growers within or near a quarantine county wish to proactively spray their commodities, CDFA has prepared a list of treatments (Table 1).

#### **POSSIBLE IMPACT ON VEGETABLES**

The only significant leafroller pest of vegetable crops in California is omnivorous leafroller on peppers. LBAM attacks a number of vegetables such as broad bean, carrot, cole crops, parsley, pepper, potato, sweet pea, and tomato. Although it is impossible to predict how LBAM will affect California vegetable-growing systems, in Australia LBAM is only a minor pest of vegetable crops.

The best strategy for growers and pest control advisors is to follow the procedures for sampling caterpillars on vegetables found in the *UC IPM Pest Management Guidelines* (<http://www.ipm.ucdavis.edu/PMG/>). Check for signs of leafroller activity when monitoring fields. Look for leafroller egg masses, webbed leaves, and leaves webbed against fruit surfaces.

Materials available to control leafrollers and other caterpillar pests on vegetable crops are also effective on LBAM. In quarantine zones, treatments may be warranted to prevent the presence of leafrollers in harvested vegetables. Formulations of *Bacillus thuringiensis* ssp. *kurstaki* and spinosad are available for organic vegetable growers. Control weeds in and around fields to reduce survival and overwintering of leafroller larvae.

If a suspected caterpillar is found, collect it and webbed leaves and take the sample to the local agricultural commissioner. For information about chemical treatments for a vegetable field suspected to be infested by LBAM, contact the local UC Cooperative Extension Office or the local agricultural commissioner.

### POSSIBLE IMPACT ON STRAWBERRIES

Strawberry fruit are not considered to be preferred host material for LBAM, and current California production practices already use measures that are effective at suppressing LBAM. However, there is potential to confuse larvae of endemic leafrollers with LBAM larvae. The species that occurs most commonly is garden tortrix. Others are apple pandemis, orange tortrix, omnivorous leafroller, and strawberry leafroller. These leafrollers have life cycles and feeding patterns similar to each other and to LBAM. Their primary damage occurs when they feed on the surface of fruit.

Begin a monitoring program by examining leaves for leafroller egg masses and larvae, especially the characteristic webbing together of leaf surfaces. Destroy any fruit showing evidence of larval feeding. Because it is difficult to distinguish larvae of LBAM from endemic leafroller species, special care should be taken to keep all leafrollers from contaminating fruit, baskets, or boxes, and to keep any leaves or other materials that might harbor leafrollers out of the pack.

Several chemicals registered for use on strawberries for endemic leafrollers and other caterpillar pests are named as controls for LBAM in Australian studies. These include *Bacillus thuringiensis* ssp. *kurstaki* (various formulations of Bt), spinosad (Entrust and Success), methoxyfenozide (Intrepid), bifenthrin (Brigade), and methomyl (Lannate). Organic growers can use approved formulations of Bt and spinosad. However, additional care may be needed to prevent infestations of LBAM in organic production fields because other insect pests are not being managed with conventional products that would incidentally control LBAM.

Second-year production fields should be closely monitored and plowed under if abandoned during the season to prevent them from becoming a potential source of LBAM infestations. Controlling weeds and removing trash in and around strawberry fields helps reduce survival and overwintering of leafrollers. For more information on managing leafrollers in strawberries, see the *UC IPM Pest Management Guidelines: Strawberry* at <http://www.ipm.ucdavis.edu/PMG/>.

If a suspected caterpillar is found, collect it and any webbed leaves or fruit where it is feeding and take the sample to the local agricultural commissioner.

### POSSIBLE IMPACT ON CANEBERRIES

Several leafrollers, including apple pandemis, omnivorous leafroller, and orange tortrix, are pests in California caneberreries. They are especially common in blackberries. Although it is impossible to predict, LBAM is likely to become a significant pest of these crops if it becomes established in California. Management of leafrollers in quarantine zones is aimed at preventing any leafrollers in harvested berries.

Monitor caneberreries for any leafroller infestation by looking for evidence of egg masses, larvae, pupae, pupal cases, webbing, and feeding damage regularly during the season. Destroy fruit with signs of larval feeding.

Materials registered for leafroller control in caneberreries will also control LBAM. Formulations of *Bacillus thuringiensis* ssp. *kurstaki* and spinosad are available for organic growers. All pesticide applications will be more effective when targeted at the early instars of the larvae. Because generations can overlap, it may be useful for growers to repeat applications if evidence of tortricids continues to be found during the season.

Proper field management of caneberry crops can also substantially reduce risk of LBAM infestation. Most overwintering tortricid larvae survive in surrounding weeds or in trash on and beneath the canes, so these should be removed or disced into the ground. For more information on managing leafrollers in caneberreries, see the *UC IPM Pest Management Guidelines: Caneberries* (<http://www.ipm.ucdavis.edu/PMG/>).

If you find eggs or larvae that you suspect might be LBAM, contact the local local agricultural commissioner.

### POSSIBLE IMPACT ON VINEYARDS

Presently in California two tortricid leafrollers may appear as pests in vineyards. Orange tortrix is common in

coastal vineyards, and the omnivorous leafroller is found in hot inland valleys, but may also be present in warmer coastal areas. If established, LBAM would probably cause damage similar to that of these two leafrollers. In its native range, LBAM does not do well at high temperatures but thrives in cooler areas with mild summers. Depending on the climatic conditions, LBAM may have from 2 to 4 generations a year.

As with other leafrollers, feeding damage to the buds may occasionally be caused by the overwintering larvae. In the spring, feeding on developing bunches may cause extensive loss of flowers or newly set berries. In the summer, damage is caused by LBAM larvae entering bunches and feeding along the bunch stem and on the berries. Damage to developing and ripening bunches can increase the incidence of Botrytis bunch rot.

As with other leafroller pests on grapevines (see *UC IPM Pest Management Guidelines: Grape* at <http://www.ipm.ucdavis.edu/PMG/>), there are a number of control strategies available for LBAM management. An important method for reducing overwintering populations is to remove broadleaf weeds and cluster mummies when pruning, then place them in row middles and disc them into the ground.

The effect of natural enemies on LBAM in California is presently unknown. Leafrollers are controlled by several predators such as lacewings, spiders, minute pirate bugs, damsel bugs, and bigeyed bugs, and by several parasitic wasps. Since predators are generalists, they will feed on LBAM. Studies will be needed to determine if the parasitoids that attack native leafrollers may shift to parasitize LBAM.

If insecticide treatment is necessary, then applications can be timed by monitoring flights with pheromone traps, tracking seasonal development with a degree-day model, and field monitoring. There are several reduced-risk insecticides available for control of LBAM. Spraying is most effective after eggs have hatched, but before caterpillars build feeding shelters. It is important to control larvae early in the season before bunch closure. Insect growth regulators are registered for the control of leafrollers in grapevines. *Bacillus thuringiensis* and a formulation of spinosad are approved for use on organically certified grapes.

If a suspected LBAM caterpillar is found, collect it and the webbed leaves or fruit where it is feeding and take the sample to the local agricultural commissioner.

If LBAM becomes established in California, production costs will increase due to additional monitoring (traps and scouting) needed for this pest and control measures in those regions where climate conditions favor LBAM.

### POSSIBLE IMPACT ON TREE CROPS

**Stone Fruits.** Stone fruits in California are attacked by a variety of leafroller species including the fruittree leafroller, obliquebanded leafroller, and omnivorous leafroller. LBAM is damaging to stone fruits grown in warmer areas of Australia, but it cannot be predicted how serious it may become on stone fruits in California. Because many of California's stone fruits already must meet international shipping standards, LBAM is not likely to add significant hardships to growers who presently manage the other leafrollers and species such as the oriental fruit moth and peach twig borer in their orchards.

Parasitoids such as *Macrocentrus* spp., *Cotesia (Apanteles)* spp., and *Exochus* spp. commonly attack leafroller larvae, and predators such as lacewings, assassin bugs, minute pirate bugs attack the eggs and larvae. The presence of LBAM in orchards will probably provide an additional food source for these natural enemies.

Follow the monitoring recommendations for leafrollers in the *UC IPM Pest Management Guidelines* for stone fruits. Monitoring for leafroller activity in early spring is very important because many available control materials are most effective on young larvae.

Management programs are already in place for the common leafrollers, and the recommended reduced-risk insecticides (e.g., spinosad, insect growth regulators, and Bt) are also recommended for LBAM suppression. Application of chlorpyrifos is limited to dormant and delayed-dormant periods in stone fruit crops, and other alternatives are available (narrow range oil, esfenvalerate) that may have lesser environmental impacts than chlorpyrifos. For more

information on managing leafrollers in stone fruits, see the *UC IPM Pest Management Guidelines* at <http://www.ipm.ucdavis.edu/PMG/> for stone fruit crops.

If a suspected LBAM caterpillar is found, collect it and the webbed leaves or fruit where it is feeding and take the sample to the local agricultural commissioner.

**Pome Fruits.** Pome fruits are attacked by several types of leafrollers including fruittree leafroller, obliquebanded leafroller, apple pandemis, and orange tortrix. As its name implies, LBAM is an important pest of apples and pears. The primary concern is the trade restrictions imposed by importing countries. If LBAM is found in pome fruit-producing counties, the inability to export fruit to some countries may cause severe economic hardship to the industry. Also, feeding damage to the fruit may reach economic levels.

Leafroller larvae cause superficial injury to the fruit surface and may cause extensive damage when feeding in between the fruit in a cluster. Sometimes the larvae burrow into the fruit around the stem. Small larvae may enter the fruit through the calyx or cause “stings” on the fruit surface.

Follow the monitoring procedures for leafrollers given in the *UC IPM Pest Management Guidelines* for apple and pear. Watch for leafroller egg masses and signs of leafroller activity when monitoring orchards. Look for leaves webbed together and leaves webbed against fruit.

The management of LBAM is similar to the control of other leafrollers of pome fruit (see *UC IPM Pest Management Guidelines* for apples and for pears at <http://www.ipm.ucdavis.edu/PMG/>). Sanitation includes removal of winter weeds and thinning of fruit. If insecticide treatment is necessary, several reduced-risk insecticides are available for control of LBAM. Good early-season control is essential.

If a suspected LBAM caterpillar is found, collect it and the webbed leaves or fruit where it is feeding and take the sample to the local agricultural commissioner.

**Citrus and Avocado.** Citrus crops in California are attacked by a number of leafroller pests (fruittree leafroller, Amorbia, omnivorous leafroller, orange tortrix). Amorbia (western avocado leafroller) is the main leafroller pest of avocado, with orange tortrix being a minor pest in coastal areas. Leafrollers usually are minor or sporadic pests in citrus and avocado because parasites keep their populations below damaging levels. LBAM is damaging to citrus grown in Australia and is a minor pest of avocado in New Zealand. Although it cannot be predicted how serious it may become on citrus and avocado in California, it is likely to be a minor pest as long as natural enemies aren't severely disrupted by broad-spectrum pesticides. However, if LBAM were found in citrus and avocado growing areas of California, quarantine restrictions, if enacted, would have a serious economic impact on exports.

Impact on citrus is likely to be similar to damage from Amorbia, which feeds in the spring on new flush, newly set fruit, or on ripening Valencias. Early in spring, young larvae feed mostly on new growth flushes, often resulting in curled leaf terminals. Damage to young fruit occurs when the larvae web and feed under the calyx end of the fruit causing a ring scar similar to citrus thrips. Damage to maturing fruit occurs when larvae tie leaves to the fruit, feeding on the rind and sometimes boring inside. This injury provides entry sites for secondary decay organisms, and fruit will drop within 1 to 2 weeks. Fruittree leafroller is primarily a pest when it attacks older fruit, including ripening Valencias, navels, and grapefruit. Whether LBAM in California would become a pest of older fruit is unknown.

Impact on avocado also is likely to be similar to damage from Amorbia. Economic damage occurs primarily when larvae web leaves to fruit or feed among fruit touching in a cluster. Larvae feed on fruit skin, causing a scarring that results in downgrading or culling of fruit.

Look for LBAM under the sepals at the calyx end of young citrus fruit, under leaves webbed against maturing fruit, and where avocado fruit touch in clusters. Monitoring recommendations for Amorbia in the *UC IPM Pest Management Guidelines* for citrus and avocado may be useful. Monitor for signs of larval activity throughout the year because LBAM larvae remain active during the winter.

Parasitoids such as *Macrocentrus* spp., *Cotesia (Apanteles)* spp., and *Exochus* spp. commonly attack leafroller larvae, and predators such as spiders, lacewings, assassin bugs, and minute pirate bugs attack the eggs and larvae. The presence of LBAM in citrus and avocado orchards will probably provide an additional food source for these natural enemies. Management programs are already in place for the common leafrollers, and the reduced-risk insecticides (e.g., spinosad and Bt) recommended for their control are also recommended for LBAM suppression. In avocado, Bt applications may be effective on young larvae. In citrus, Bt may be applied before petal fall. At or after petal fall, a tank mix of spinosad plus either chlorpyrifos or a pyrethroid could be used to control LBAM; for more information see the *UC IPM Pest Management Guidelines* for citrus and avocado at <http://www.ipm.ucdavis.edu/PMG/>.

**Nut Crops.** Several leafroller species occur in the nut-producing areas of California, but do not cause significant damage to these crops. It is not anticipated that LBAM would become a significant pest. Because leafrollers are not found in or on nuts after they are harvested, hulled, and dried, LBAM is not a quarantine concern for these crops.

### **POSSIBLE IMPACT ON RESIDENTIAL AREAS**

LBAM was first detected in California in a residential neighborhood. Quarantine and eradication efforts include residential areas in all the affected counties.

**Detection.** The primary method of detecting LBAM is pheromone traps put out by CDFA and the county agricultural commissioners and checked regularly by state biologists. Residents and businesses may be asked to allow one to be placed on their property.

If LBAM is found in a neighborhood, the area will be put under a quarantine by CDFA, which means that no one can move affected plants, vegetables, flowers or fruit from the quarantined area and must follow other local restrictions. In addition, community gardens within the quarantine area must be issued a compliance agreement from their county agricultural commissioner that allows movement of produce out of the garden, and all green waste from gardens must be disposed of through the local municipal green waste services to be sure of proper destruction.

If LBAM is found, CDFA and the county agricultural commissioner may make an eradication treatment with an insecticide. Currently an organic formulation of *Bacillus thuringiensis* (Bt) is being used for residential treatments. This material has low toxicity to humans and wildlife and is safe for the environment.

If you find a moth or caterpillar that resembles LBAM in your garden, take it to your county agricultural commissioner's office for identification or call the CDFA Pest Hot Line at (800) 491-1899. Many other common leafrollers resemble LBAM and it is difficult to distinguish among them.

**Controlling LBAM in Your Garden.** Currently, monitoring and control of LBAM in all locations is being done by CDFA and the county agricultural commissioners.

Although LBAM attacks many types of plants, it is not likely to cause serious damage to them in backyard situations. In many cases, treatment would not be needed in backyards, except to limit spread of this pest to commercial agriculture where the impact could be very serious. However, where LBAM is causing significant damage, it can be controlled effectively with several low-toxicity home-use insecticides, including *Bacillus thuringiensis* and spinosad. These materials must be applied to the larval (caterpillar) stage of the insect and repeat applications may be necessary. Good coverage of all plant surfaces is necessary for effective control.

For more information, check with the county agricultural commissioner for local restrictions. Also see the CDFA LBAM Web page for regularly updated maps of new infestations.

### **AGRICULTURE–URBAN INTERFACE**

People living close to agricultural operations should be aware that there may be occasions when nearby growers will be applying pesticides more often than usual. This is likely to be a short-term occurrence and is necessary in order to meet regulatory requirements and contain the spread of a pest that can cause great damage to California's economy.

Where agricultural operations are close to homes, schools, or other nonagricultural situations, growers should consider using less-toxic materials (as allowed by regulations), larger droplet size, or a spray additive to reduce drift.

## Acknowledgments

We appreciate the interest and expertise of the following individuals who contributed information or reviewed this publication in whole or in part: **Courtney Albrecht**, Program Supervisor, CDFA Interior Pest Exclusion; **Greg Baker**, Entomologist, SARDI, South Australia; **Walt Bentley**, IPM Advisor, UC Statewide IPM Program; **Larry Bettiga**, Farm Advisor, UC Cooperative Extension, Monterey County; **Dennis Bray**, Agricultural Commissioner, Alameda County; **Brian Cahill**, Senior Agricultural Biologist, CDFA Pest Exclusion; **Eckehard Brockerhoff**, Senior Scientist, Ensis, New Zealand; **Ken Corbishley**, Agricultural Commissioner, Santa Cruz County; **Steve Dreistadt**, Principal Editor, UC Statewide IPM Program; **Marc Epstein**, Senior Insect Biosystematist, CDFA Plant Pest Diagnostics; **Elizabeth Grafton-Cardwell**, CE Specialist & Entomologist, Entomology, UC Riverside; **Peter Kerr**, Associate Insect Biosystematist, CDFA Plant Pest Diagnostics; **Kevin Hoffman**, Primary State Entomologist, CDFA Pest Detection/Emergency Projects; **Nicola Irvin**, Specialist, Entomology, UC Riverside; **John Kabashima**, County Director, UC Cooperative Extension, Orange County; **Andrew Loch**, Entomologist, Department of Primary Industries, New South Wales; **Vic Mastro**, Laboratory Director, Pest Survey Detection and Exclusion Laboratory, USDA APHIS; **Rick Melnicoe**, Pesticide Coordinator, UC ANR; **Nicholas Mills**, Professor, Environmental Science, Policy and Management, UC Berkeley; **Phil Phillips**, IPM Advisor, UC Statewide IPM Program and UC Cooperative Extension, Ventura County; **Rhonda Smith**, Farm Advisor, UC Cooperative Extension, Sonoma County; **Joyce Strand**, Associate Director, UC Statewide IPM Program; **Steve Tjosvold**, Farm Advisor, UC Cooperative Extension, Santa Cruz County; **Laura Tourte**, County Director, UC Cooperative Extension, Santa Cruz County; **Sonya Varea Hammond**, County Director, UC Cooperative Extension, Monterey County; **David Williams**, Principal Scientist, Department of Primary Industries, Victoria; **Bill Woods**, Department of Agriculture and Food, Western Australia; **Cathy Young**, Entomologist, Department of Primary Industries and Water, Tasmania.

Publication Design: **P. N. Galin**, UC Statewide IPM Program.

## Precautions for Using Pesticides

Pesticides are poisonous and must be used with caution. **READ THE LABEL BEFORE OPENING A PESTICIDE CONTAINER.** Follow all label precautions and directions, including requirements for protective equipment. Apply pesticides only on the crops or in the situations listed on the label. Apply pesticides at the rates specified on the label or at lower rates if suggested in this publication. In California, all agricultural uses of pesticides must be reported. Contact your county agricultural commissioner for further details. Laws, regulations, and information concerning pesticides change frequently. This publication reflects legal restrictions current on the date next to each pest's name.

**Legal Responsibility.** The user is legally responsible for any damage due to misuse of pesticides. Responsibility extends to effects caused by drift, runoff, or residues.

**Transportation.** Do not ship or carry pesticides together with food or feed in a way that allows contamination of the edible items. Never transport pesticides in a closed passenger vehicle or in a closed cab.

**Storage.** Keep pesticides in original containers until used. Store them in a locked cabinet, building, or fenced area where they are not accessible to children, unauthorized persons, pets, or livestock. **DO NOT** store pesticides with foods, feed, fertilizers, or other materials that may become contaminated by the pesticides.

**Container Disposal.** Dispose of empty containers carefully. Never reuse them. Make sure empty containers are not accessible to children or animals. Never dispose of containers where they may contaminate water supplies or natural waterways. Consult your county agricultural commissioner for correct procedures for handling and disposal of large quantities of empty containers.

**Protection of Nonpest Animals and Plants.** Many pesticides are toxic to useful or desirable animals, including honey bees, natural enemies, fish, domestic animals, and birds. Crops and other plants may also be damaged by misapplied pesticides. Take precautions to protect nonpest species from direct exposure to pesticides and from contamination due to drift, runoff, or residues. Certain rodenticides may pose a special hazard to animals that eat poisoned rodents.

**Posting Treated Fields.** For some materials, restricted entry intervals are established to protect field workers. Keep workers out of the field for the required time after application and, when required by regulations, post the treated areas with signs indicating the safe re-entry date. Check with your county agricultural commissioner for latest

restricted entry interval.

**Preharvest Intervals.** Some materials or rates cannot be used in certain crops within a specified time before harvest. Follow pesticide label instructions and allow the required time between application and harvest.

**Permit Requirements.** Many pesticides require a permit from the county agricultural commissioner before possession or use. When such materials are recommended, they are marked with an asterisk (\*) in the treatment tables or chemical sections of this publication.

**Processed Crops.** Some processors will not accept a crop treated with certain chemicals. If your crop is going to a processor, be sure to check with the processor before applying a pesticide.

**Crop Injury.** Certain chemicals may cause injury to crops (phytotoxicity) under certain conditions. Always consult the label for limitations. Before applying any pesticide, take into account the stage of plant development, the soil type and condition, the temperature, moisture, and wind. Injury may also result from the use of incompatible materials.

**Personal Safety.** Follow label directions carefully. Avoid splashing, spilling, leaks, spray drift, and contamination of clothing. NEVER eat, smoke, drink, or chew while using pesticides. Provide for emergency medical care IN ADVANCE as required by regulation.

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# CDFA Light Brown Apple Moth Brochure

February 15, 2008

*The CDFA's brochure for the general public regarding background on the LBAM and the potential problems caused by it.*



# THE LIGHT BROWN APPLE MOTH

Before it matures into an adult moth (right), the Light Brown Apple Moth's caterpillar stage feeds on leaves and new plant growth. It can also directly damage several kinds of fruits and vegetables.



An invasive pest  
of California's  
environment,  
natural habitat  
and agriculture



“...we applaud CDFA’s decision to use an approach to the Light Brown Apple Moth that relies on the principles of IPM [integrated pest management] and that uses a pheromone-based approach instead of toxic insecticides.”

**GINA M. SOLOMON, M.D., M.P.H., SENIOR SCIENTIST  
NATIONAL RESOURCES DEFENSE COUNCIL (NRDC)**

## How do pheromones work?

Insect pheromones are signals that some insects release to attract mating partners or trigger other behaviors. Humans and other mammals do not respond or react to these insect pheromones and cannot detect them. These pheromones are present in our environment every day.

When we release the pheromone, the treatment works by surrounding the male moths in the area with the pheromone, distracting them so they cannot locate mating partners. The moths simply live out their natural life cycles without being able to locate and mate with a female moth. As breeding subsides, the colony collapses.

## Are pheromones safe?

Studies of the LBAM pheromone in particular and of the interaction of pheromones and mammals in general have shown no evidence for concern about exposure to pheromones, even at much higher levels than those present in the aerial treatment approach. The Environmental Protection Agency (EPA), the primary reviewer of pheromone products, does not perform long-term human testing for any pesticide; however, animal studies indicate a large margin of safety for even the most sensitive groups. Based on low toxicity in animal testing, and thus expected low exposure to humans, no risk to human health is expected from the use of these pheromones. During more than a decade of using moth pheromones to control LBAM infestations in Australia and New Zealand, no adverse effects have been reported. Pheromones’ safety record has also prompted the EPA to conclude that consumption of food containing pheromone residues presents no risk. The USDA has also approved this pheromone and others for use on organic crops.

“This really is a benign pest control agent. It is much safer than commonly used home cleaning and home pest control products. In fact, as humans, our bodies are unable to recognize and/or even react to pheromones produced by insects.”

**DR. CARL WINTER, TOXICOLOGIST AND DIRECTOR  
UNIVERSITY OF CALIFORNIA, DAVIS FOODSAFE PROGRAM**

## What is the Light Brown Apple Moth?

The Light Brown Apple Moth (LBAM) is a small moth, approximately ¼ inch in length, and is generally tan with some darker markings. It is originally from Australia and has also infested New Zealand, New Caledonia, Hawaii and the British Isles. It feeds on such a wide variety of plants that it is considered a significant threat to the environment as well as to agricultural crops. Other nations and territories understandably want to keep it out, and they typically impose trade restrictions such as plant and crop prohibitions, inspections or other requirements to do so. Now that LBAM has been detected in California, officials in Canada and Mexico have imposed such restrictions on the affected areas, complicating and curtailing agricultural exports for local growers.



## What damage does the LBAM do?

Before it matures into an adult moth, the LBAM caterpillar feeds on and damages the leaves and new growth of plants. On some crops including grapes, apples, citrus and avocado, LBAM larvae also feed directly on the fruit, rendering it unmarketable. More than 250 kinds of plants are targeted by this pest including Monterey pine, cypress, oak, roses and many common crops and ornamental plants. Most any plant in the average garden or yard is on the list.

## How can we eradicate the LBAM?

The centerpiece of the eradication project is aerial releases of the moth pheromone Checkmate LBAM-F to confuse male light brown apple moths and keep them from locating a mate. As breeding subsides, the colony will collapse. The pheromone is the most environmentally friendly alternative available to eradicate this infestation. The overall program also relies on other elements such as insect trapping, surveys, and inspection and treatment of plants and crops to make sure the infestation does not spread.

“LBAM is a generalist defoliator with a long host list including such important native conifers as coast redwood, Douglas fir, grand fir, pine, spruce and cypress species. . . . In the absence of its native predators and parasites, LBAM could easily explode through California forests causing yet another wave of dead trees and shrubs and the associated costs.”

**RUTH COLEMAN, DIRECTOR**  
**CALIFORNIA DEPARTMENT OF PARKS AND RECREATION**



Aerial application of the pheromone acts to distract the male LBAM (left) so that he cannot find a mate. As reproduction subsides, the colony collapses.

### Is aerial treatment the best option?

Alternatives including mass trapping, sterile insect technique (SIT), pheromone twist-ties and conventional pesticides were all evaluated by a Technical Working Group of scientists.

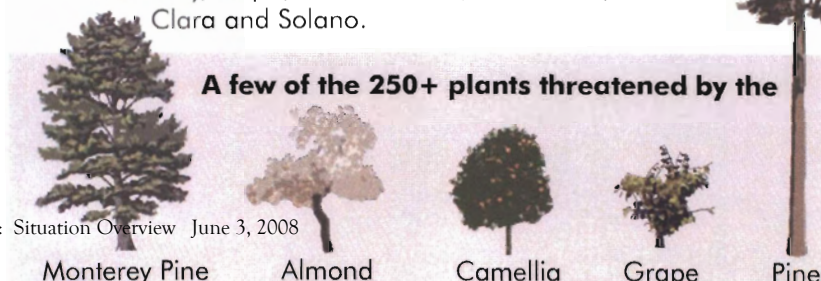
**Conventional pesticides:** A number of conventional pesticides, including some that are approved for use on organic crops, would be effective against the LBAM. Unfortunately, these products would also affect endangered insects, Monarch butterflies and other beneficial insects such as pollinators. The pheromone is specific to the LBAM species and, since it is not toxic, it leaves these endangered and beneficial insect populations unaffected.

**Trapping or twist-ties:** Traps are effective to detect a pest and are a very valuable part of this program, but deploying an array of traps or twist-ties dense enough to be effective as an eradication tool would require thousands of staff and millions of traps/ties, neither of which are available in sufficient quantities. Operationally, this approach is not feasible over a large area or region.

**Sterile Insect Technique:** Australia and New Zealand have begun developing the facilities, equipment, expertise and technologies needed to conduct sterile insect releases for LBAM. The theory of SIT is sound and the prospects for LBAM are promising, but the project will take years to develop. USDA is working with its international partners to accelerate this process as much as possible so that this option is available in the future.

### What areas are infested?

Infestations have been found in California's Central Coast and Bay Area communities including portions of the counties of Alameda, Contra Costa, Marin, Monterey, Napa, San Francisco, San Mateo, Santa Clara and Solano.



A few of the 250+ plants threatened by the

Monterey Pine

Almond

Camellia

Grape

Pine

## Why is this an emergency?

The biology of the pest and the recent arrival of the infestation are the driving factors in the urgency of these treatments. A national pest survey in 2005 confirmed that the moths were not present in California at that point. The survey relied on the same pheromone-based traps now in use, and traps were set in several of the same areas now known to be infested. The populations of LBAM are still relatively small and are considered by an international panel of expert scientists to be susceptible to eradication—but only if we take significant action promptly.

The LBAM infestation could grow exponentially with approximately five mating cycles per year and each female moth laying hundreds of eggs per cycle. Failure to act quickly invites substantial environmental and economic impacts.

The program's emergency status allows the eradication to begin under a temporary exemption from environmental analysis, with the understanding that a full environmental assessment of the project, including these emergency treatments, will be completed. That assessment will likely take more than a year to complete, and the process has already begun. If we were to wait that long to begin the eradication effort, experts agree that the infestation would be well beyond reach, spreading over a larger area and multiplying exponentially through several breeding cycles.

## Do these pheromone applications affect beneficial insects, endangered species or Monarch butterflies?

Although moths and butterflies are similar insects, the pheromones used by their separate species are different. Monarch butterflies are not attracted to the light brown apple moth pheromone and will not be confused or otherwise affected by it. The pheromone treatment is water-based and contains no oils or other materials that would pose a threat to the Monarch population.

As an alternative to conventional pesticides, the pheromone has the distinct advantage of being highly specific to the LBAM, so mammals and other organisms are not affected. In the pheromone-based traps used to detect LBAM, we have trapped only limited numbers of five closely related moth species, further indicating the highly specific nature of this pheromone. Two of these other species are also invasive pests, although they are not considered significant threats because they do not share the LBAM's wide host range and rapid reproductive cycle. Because these other moths are permanently established in the region beyond the limits of the LBAM treatment area, any reduction in these populations would be expected to rebound after LBAM eradication treatments subside.

### Light Brown Apple Moth:



## Do these pheromone applications affect the ocean, fish, and aquatic invertebrates?

The EPA has established that pheromone applications are not toxic to fish or aquatic invertebrates because pheromones are insoluble in water. While the scientific data strongly establishes that this product is not harmful to aquatic life, we have also engaged local ecotoxicologists with the University of California to conduct further study to ensure that concerns raised by environmental groups are thoroughly addressed. Early results show no harm to aquatic life.

Toxicity aside, applying pheromones over water is unnecessary to eradicate the LBAM infestation because the moths do not live, breed or feed there. The eradication project can be successful without applying the pheromone over the ocean and other bodies of water, so we have established strict protocols including buffer zones to ensure that we are applying the pheromone only over land.

### How are the aerial treatments done?

Three King Air twin-turbine airplanes fly over the treatment areas along parallel paths set by GPS systems. The treatments are performed at night to minimize the inconvenience to the community and because there is less air traffic. The planes release the Checkmate LBAM-F pheromone product through spray nozzles beneath the wings. The planes typically return to the airport and reload several times during the night.

**Weather plays a significant role** in any aerial treatment. Typically, inclement weather or winds of over 10 miles per hour will cause a delay or postponement. If the weather or winds subside, treatment may resume the same night. If not, treatment usually resumes on the next clear night.

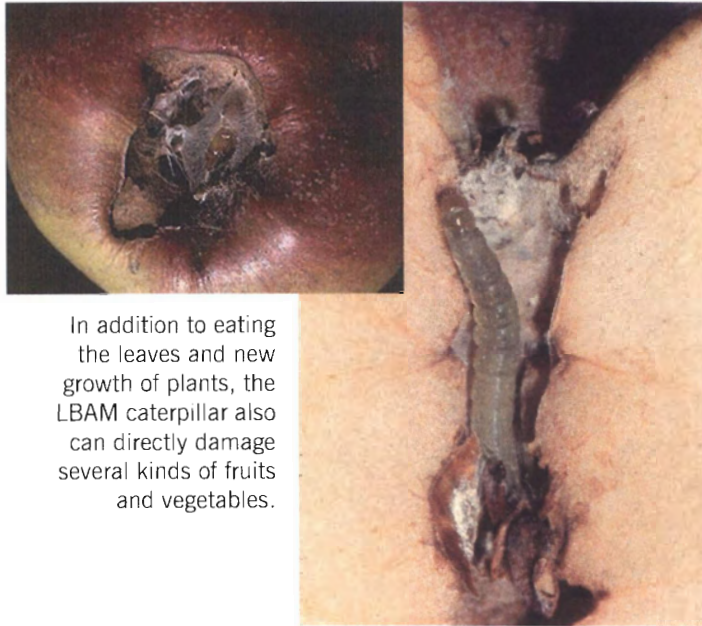
During treatment periods, CDFA offers automatic e-mail updates about the treatment schedule and any delays or rescheduling—please sign up online at [www.cdfa.ca.gov/lbam](http://www.cdfa.ca.gov/lbam). Updates are also available by calling the hotline at 1-800-491-1899.

During treatments, CDFA also communicates with local officials and members of the media to provide updates if Mother Nature or any other factor imposes a change in plans.



Cypress





In addition to eating the leaves and new growth of plants, the LBAM caterpillar also can directly damage several kinds of fruits and vegetables.

## How does the Light Brown Apple Moth affect our local economy?

The current LBAM infestation has already caused the nations of Canada and Mexico to impose onerous restrictions on exports of crops and plants from the infested areas of California. China also has begun the kind of information gathering that frequently leads to such trade restrictions. As businesses are forced to delay, reduce or abandon exports to these nations, employment, investment and tax levels are all adversely impacted. Internally, restrictions are also imposed by CDFA and USDA on businesses such as plant nurseries in the infested areas so that their counterparts outside of the area can be protected from the infestation. These businesses must comply with strict regulations that limit or delay the companies' ability to export their plants outside the area. If the infestation is not eradicated, these regulations and trade restrictions would continue indefinitely and other countries would likely adopt similar measures.

## What can I do to help?

Invasive species such as the LBAM can arrive in California in any number of ways, but the most common method is for international travelers to bring in prohibited fruits, vegetables, plants, soil, seeds or related items. Please leave these items in their native countries. If you think you have seen or captured an invasive pest, CDFA also operates a toll-free pest hotline at 800-491-1899. Residents of LBAM treatment areas are also welcome to use this hotline for updates and information about the eradication project.

The LBAM is part of a family of moths called "leafrollers" because the caterpillar rolls the edges of a leaf around itself for protection.



Oak



Redwood

**The following agencies and organizations consider the aerial pheromone treatment approach for the eradication of LBAM to be acceptable:**

U.S. Environmental Protection Agency (EPA)  
California Department of Pesticide Regulation (DPR)  
California Office of Environmental Health Hazard Assessment (OEHHA)  
California Department of Parks and Recreation  
California Department of Public Health (DPH)  
Central Coast Regional Water Quality Control Board  
U.S. Fish and Wildlife Service  
Monarch Watch  
Otter Project (Monterey County)

**CDFA PEST HOTLINE:**

**1-800-491-1899**

**LBAM PROGRAM E-MAIL:**

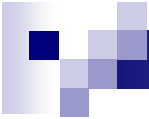
**[lbam@cdfa.ca.gov](mailto:lbam@cdfa.ca.gov)**

**SIGN UP FOR E-MAIL UPDATES:**

**[www.cdfa.ca.gov/lbam](http://www.cdfa.ca.gov/lbam)**



**[www.cdfa.ca.gov/lbam](http://www.cdfa.ca.gov/lbam)**



# Light Brown Apple Moth (LBAM) Economic Impacts and Solutions: Clearing the Air in the CDFA, USDA Pesticide Program on Nine Northern California Counties

May 5, 2008

*Detailed assessment of the potential economic impacts from the LBAM. Prepared by an anti-spray group.*

**Light Brown Apple Moth (LBAM)**

# **ECONOMIC IMPACTS AND SOLUTIONS**

**Clearing the Air  
in the  
CDFA, USDA Pesticide Spray Program  
On Nine Northern California Counties**



**C.A.S.S. RESEARCH SUMMARY  
Economics Action Team  
May 5, 2008**



**Contact: Foster Gamble 464-1777  
foster@cassonline.org**

Light Brown Apple Moth (LBAM)

**ECONOMIC  
IMPACTS AND SOLUTIONS**

Clearing the Air  
in the  
CDFA, USDA Pesticide Spray Program  
On Nine Northern California Counties

**C.A.S.S. ECONOMICS RESEARCH SUMMARY**

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## **INTRODUCTION**

The purpose of this document is to provide a succinct collection of key facts, data and insights about the potential negative economic impacts of the LBAM pesticide spray program on affected communities, and to offer safe, just and effective alternative solutions.

Aerial spraying of an untested pheromone pesticide is currently targeted over residential communities with almost 7 million people in 9 counties throughout Northern California. The California Department of Food and Agriculture (CDFA) has initiated this program in response to a quarantine against the Light Brown Apple Moth. The communities include the counties of Alameda, Contra Costa, Marin, Monterey, San Francisco, San Mateo, Santa Clara, Santa Cruz and Solano. Monterey and Santa Cruz were already sprayed in September, October and November and are scheduled to be sprayed again starting August 17, 2008. The San Francisco Bay area is slated to be sprayed starting sometime after that.



People from all walks of life are contributing their time and expertise and numerous officials say they have never before experienced such vast and informed opposition. It is our hope that what follows here will be helpful for those who want to become better informed in order to take effective actions to halt the spray and to prevent this type of thing from happening again.

## **KEY DISCOVERIES**

In our collective quest to go upstream beyond the confusion and frustration to find reasonable, just and healthy solutions, we made several key discoveries. They include:

1) Negative economic impacts to the targeted communities could be vast, especially in the areas of tourism, real estate values and organic farming.



2) The CDFA has failed to address adverse health and environmental impacts, the die-off of seabirds, the effects of the chemical ingredients in the selected Checkmate pesticide, the safe and natural integrated pest management program successfully employed in New Zealand, the potential violations of US and California laws and international human rights norms, the impossibility of eradication and the potential economic impacts on individuals, businesses and schools in all nine targeted counties.

Fortunately, concerned scientists, businesspeople, journalists, parents, teachers and other citizens have researched and published vital information on the impacts ignored by the CDFA. (See endnote references, p. 39.)

3) The CDFA has hidden virtually all important information from the public and forced actions without transparency or independent public involvement. They have:

- imposed an unnecessary State of Emergency
- avoided a timely Environmental Impact Report
- concealed ingredients that, once revealed, turned out to be verifiably toxic
- used misleadingly old and irrelevant crop damage data from Australia
- exaggerated projections of damages to California agriculture
- given incomplete and inaccurate information in public presentations
- granted no bid and preferential contracts
- failed to prepare medical response teams, doctors or to offer a system for monitoring or attending to health complaints
- ignored skilled input from university scientists with viable solutions
- delayed providing official Public Access Requests for data

4) In the last 100 years there were over 30 documented cases of US Government agencies, including the USDA, EPA, Army, Navy, CIA, Department of Defense and others, intentionally testing harmful chemicals *covertly* on human populations – at least fourteen of which involved *aerial spraying*. (See Appendix E) This pattern has resulted in increasing distrust of these agencies, and appears similar to the current behavior of the CDFA and USDA pertaining to the LBAM in Northern California.

5) Many people, animals, birds and insects have already been harmed from the spray.<sup>1, 2</sup>

6) Our inalienable and constitutional rights to the protection of our safety, liberty, person and property are being violated by this spray. In violation of over 30 laws, regulations and international moral and ethical guidelines, the CDFA has ignored safe alternatives in favor of the aerial spray of toxic chemicals and synthetic pheromones on almost 7 million citizens in urban areas. (See Appendix C) On April 24, 2008 a judge in Santa Cruz County ruled to stop the spray until the Economic Impact Report was completed and passed. The questions raised by this report have been submitted to the USDA and CDFA and need to be addressed as part of their E.I.R. Other lawsuits are in process and more are being filed, including a Federal case by CASS.



7) The justification for the spray is based on flawed science and skewed, insufficient economics.

8) There is no crop damage due to the Light Brown Apple Moth.

9) LBAM is considered to be an insignificant pest in New Zealand<sup>3</sup>, <sup>4</sup>Australia, the UK and Hawaii.

10) Eradication of LBAM is most likely impossible and unnecessary.<sup>5</sup>

11) Farmers are experiencing economic damage due to US trade quarantine policy, not crop damage.

12) Narrow economic considerations are dictating policy at the expense of human rights and the health of our residents and the environment.

## **BACKGROUND – Follow the Money**

It is helpful to understand a few key concepts, core alliances and a bit of LBAM history to accurately assess the situation:

### **Quarantine**

Certain US Government protocols impact trade competition. One of these is quarantine. More than thirty years ago, the US instituted a quarantine on Australian citrus, nuts and other products because they were exposed to the Light Brown Apple Moth (LBAM). Canada and Mexico went along with the US embargo in order to maintain good trade relations with the US. As a result of restricting export of these Australian products, American growers had an advantage and prospered financially. The Light Brown Apple Moth, a native of Australia, was then discovered in Berkeley in July, 2006. Once it was found in California, the USDA quarantine then impacted US growers and farmers. In September of 2007, the Secretary of Agriculture declared a “State of Emergency.” The “State of Emergency” was based on a decades old classification of the insect and potential economic loss to growers resulting from the quarantine. There has been no crop damage from LBAM in California.

### **State of Emergency**

A State of Emergency is another protocol which impacts trade dynamics. In the case of LBAM, a State of Emergency was instituted by the head of the CDFR, a non-elected, governor - appointed bureaucrat, A. G. Kawamura. This Emergency status has significant ramifications. It allows the Government to by-pass an otherwise-required Environmental Impact Report, and to forego the usual process for public education and input. In addition, the State of Emergency enables the California Department of Food and Agriculture to access federal money through the Department of Homeland Security. President Bush’s current annual budget proposal contains \$330M in earmarks (cash allocated) for the control of three pests, with LBAM specifically mentioned.<sup>6</sup> Eighty percent of the Northern California spray program is funded through the USDA and its Director of the Emergency Management Office, Osama El Lissy. Many believe the State of Emergency was called to bypass the legal safeguard and access federal money.

## **Eradication**

Federal emergency funds are only available for eradication measures. USDA policies prevent federal emergency funding for pest management and control. CDFA has attempted 274 eradication efforts against 9 species of pests since 1982. None has been successful and both the programs and the pests are still in place. It's useful to note that no pheromone treatment has ever been used in a successful eradication of an entire species either. In addition, the California eradication program bypassed exclusive communities in Carmel, Monterey, Tehama and Seaside and a portion of Pebble Beach, including the Lodge and Golf Course, which in itself would undermine the strategy of eradication.

Of significant trade impact, however, is the fact that so long as an active attempt is made to eradicate the moth, then US crops are allowed to be exported whether or not the attempt is effective or successful. Eradication efforts are, in practice, long-term treatment plans that access federal funding. LBAM is currently managed effectively with natural measures in New Zealand, Australia and Hawaii. Among our proposed solutions is for the USDA to create new administrative rulemaking to provide "Urgency" funding for management of LBAM and other pests so that such funds are not just available for "emergency" or eradication programs.

## **Oil, Monoculture and the So-Called "Green Revolution"**

If we trace back the money roots of our current pesticide predicament, we find that agriculture took a critical turn in the mid 1900's when the so-called "Green Revolution" promised greater yields in a more cost effective manner with the use of Monoculture – the planting of a single crop over vast areas with no other plants interspersed. The initial results were encouraging, but then problems were revealed that plague us to this day. It turns out that this style of farming is less productive and more expensive than polyculture,<sup>7, 8</sup> (where more than one species of plant is grown in the same area) and organic farming, when the costs of subsidies, chemicals, energy and related health costs are included in the accounting.

Monoculture upsets the balance of nature – specifically of insects, soil and plants. Certain insect populations and weeds get out of equilibrium, because without mixed planting there are insufficient natural predators and inhibitors. The espoused "solution" is to purchase and apply pesticides and herbicides. The use of these treatments has been shown to not only kill off even more of the balancing insects and plants, but also to poison the soil, food, water and people.

Genetically modified seeds ("Round-up Ready") were engineered which could survive the immersion in pesticides, then others which could not reproduce from one year to the next ("Terminator") and now new varieties ("Traitor") which will not grow the plant from one stage to the next without being triggered by the application of particular chemicals, for which the chemical companies own the patents.<sup>9</sup> Farmers have thus become dependent on petroleum-based pesticide products and corporate-manufactured seeds to survive. In the process agriculture has turned into agribusiness, and the natural process of sustaining and evolving life is being taken over for profit and control.

This major shift in agricultural practices was initiated when the Rockefeller Foundation's Natural Science Division combined with large agricultural companies like Cargill, ADM, Bunge and Continental Grain and multinational chemical companies like DuPont and Monsanto.<sup>10</sup> This combination of research and funding created a massive force and fueled the changeover of agriculture to a petroleum base and the consolidation of family farms into factory farms. In fact, 72% of agricultural production is now controlled by the wealthiest 8% of all U.S. farms.

The wealthiest and largest 10% of farms receive 73% of governmental farm subsidies, up 67% since 2000. The value of subsidies to the bottom 80% are down 16% in the same time period.<sup>11</sup> The primary beneficiaries of subsidies are the agribusiness companies who in 2004 spent \$53.8 million on campaign contributions.<sup>12</sup>

### **Windfall Profits**

The same family whose company, Paramount Farms covers 100,000 acres and is the largest US grower of citrus and nuts is also the owner of the pesticide Company, Suterra, which provides the chemical spray for LBAM. The owners are Stewart and Lynda Rae Resnick and their company was slated to be paid \$15 Million (88%) of the initial \$17 Million contract for spraying the first two counties. If the proposed multi-year contract goes into effect, it would provide an "emergency" based windfall profit of hundreds of millions of dollars to the Resnicks. Despite being long time Democrats, they were among the top contributors to Arnold Schwarzenegger's election campaign, giving \$144,600, as well as contributing to all members of the State Agriculture Committee. Governor Schwarzenegger was the one who OK'd the State of Emergency. The contract was awarded to Suterra in spite of the fact that theirs was reportedly the most costly bid. The Resnicks and their parent company, Roll International, benefit from the quarantine, the taxpayer-funded spray and the chemical sales. Roll is the same company which, in a closed door deal in 1994 (which excluded public interest groups, environmentalists and smaller water contractors), was able to purchase controlling interest in the largest aquifer in California, the Kern Water Bank, an underground lake that had been purchased and developed with \$74 million of taxpayer dollars. The original intent was for the aquifer to act as a safeguard against drought for citizens and farmers of California.<sup>13</sup>

### **Faulty Crop Damage Projections**

Rather than access recent hard economic data, the CDFA uses figures from 1993-1994 in Australia, when growers were using the old organophosphate pesticides, to estimate that California crop damages due to LBAM might reach \$133M annually. As we looked more closely into these calculations, however, we discovered that only 11% of total production costs for LBAM was attributable to actual crop damage, and the rest was for research and treatment. If we use this 11% figure, the actual estimated crop damage from LBAM in California, *if there were to be any*, could be \$14 million instead of \$133 million. Since New Zealand and Australia stopped using organophosphate pesticides in the 1990's, LBAM has not caused any significant damage to crops. The CDFA has since raised the damage estimate to \$640 million, but with no apparent explanation. (See Appendix B)

## **POTENTIAL ECONOMIC COSTS TO COMMUNITIES**

In other recent documents, scientists and citizen researchers have reported thoroughly on the health and environmental damages of this spray program.<sup>14, 15</sup> With the CDFFA public relations focus on projected losses to farmers, the potential negative impacts on the revenue of other major businesses in the affected communities have been almost completely ignored by both the Government and the populations themselves. These looming losses are only now beginning to become a part of the community awareness and media reporting. Projected drops in revenues to our communities if the spraying resumes could easily dwarf losses due to crop damage, *should any actually occur*.

California is the most visited state in America, earning over \$88 billion in travel-related income per year. There are already reports of tourists opting to stay away from the Monterey and San Francisco Bay areas if the spray is resumed. Tourism is San Francisco's number one revenue generating industry, with visitor spending reaching \$7.37 billion in 2005. Now there have been discussions on a premier travel web site cautioning against travel plans to Northern California.<sup>16</sup> Local residents would be going out less and if aversion to being involuntarily sprayed with pesticides decreased the tourism (including entertainment and hospitality) industry even 1%, the lost revenues would be deeply felt. These figures, as well as an accompanying calculation at 10%, are outlined in this document. (The dot.com bust and September 11 attacks dropped the tourist revenues by 16.3% in 2002.<sup>17</sup>



Our most conservative estimates project **annual losses of \$198 million (1%) to \$1.98 billion (10%) for the tourist industry of the nine counties** for which aerial spraying is planned. (See Appendix A)

Some home buyers are hesitating to purchase in the nine county spray zone and real estate agents are beginning to realize the challenge of selling homes that will be immersed in toxins for years on end if CDFFA proceeds with their plan. Agents will need to disclose this new hazard or risk liability suits. The Marin Association of Realtors has already voted to oppose the planned spraying and to amend disclosure advisory forms to notify homebuyers of potential spraying.<sup>18</sup> **Real estate commissions at the same rates of loss could drop between \$17.8 -178 million dollars.**

**A 1% -10% drop in housing prices would translate into a \$25.7 – 257 billion drop in the value of housing assets.** (See Appendix A) Not only are houses the primary repository of most people's equity, but if people choose to leave the sprayed counties, their houses could be difficult to sell.



Monterey and Santa Cruz counties are frequently referred to as the epicenter of organic farming in the US. Even though the USDA has technically allowed organic growers to continue to qualify their food as organic even after it's exposed to the pheromone-pesticide spray, discerning shoppers are not buying it - the logic or the food. Buyers are asking for labeling of sprayed produce at the markets. The result is a projected loss of revenue for organic farmers. The California Certified Organic Farmers (CCOF) officially reversed their initial support of the spray and has joined efforts to implement a safe alternative. **Organic farming could lose \$2.8 M million to \$28.8 million annually in just these two counties**, if the spray resumes. (Appendix A) The discovery of E-Coli in California Spinach from the Monterey area quickly dropped the revenues for the spinach growers from \$258.3M by \$74M, a loss of 28%).<sup>19</sup>

### **Estimated total annual losses in revenue for all 9 counties**

for the combined areas of:

- 1) Tourism and related construction and tax revenue
- 2) Losses to Organic farming
- 3) Losses in Real Estate Commissions

total: **\$200M (estimated at a 1% reduction due to spray) or \$2 Billion in losses (at 10%)**

(See Appendix A)

### **Taxpayer Costs - Paying to Spray Ourselves**

These figures do not include the hundreds of millions of taxpayer dollars that are intended to be used for funding the spray (\$100-500M+), the CDFR's public relations efforts and the legal fees to fight the vast socio-political and legal backlash that is emerging among the nearly 7 million people targeted for immersion in the pheromone pesticide spray. If the moth is not eradicated, the next five years of the 10-year license could run the cost to taxpayers close to a billion dollars. Remember, no such program, out of 274, has ever successfully eradicated a species.<sup>20</sup>

### **Compensation Costs**

Not included here are the economic losses are the costs associated with evacuating, housing and caring for the chemically sensitive, disabled, pregnant, elderly and infant residents as well as those who rationally choose to leave to avoid the risk of serious damage to their health.

### **Miscellaneous Costs**

As we begin to imagine the predicament of large urban areas continually immersed in toxins, other potential areas of lost revenue arise. A few examples: lost workdays/productivity as people get sick, outside workers who might skip their shifts on the nights sprayed, resulting in lost

productivity (police, firemen, night-time construction crews, transit workers, etc), outdoor weddings, sporting events, emergency room visits from sick residents without insurance, lost revenue to schools due to increased absenteeism. (In a sampling of six high schools in Santa Cruz County after the spray, average absences in the three days following the spray were more than double the average of the three prior months.<sup>21</sup>) The Berkeley Unified School District Board of Directors has recently passed a resolution opposing the LBAM aerial spray program.

### **Citizens Taking a Stand for No Spray**

Citizens have persuaded political representatives to file numerous legislative bills and city resolutions against the spray. Already 19 cities and two counties, representing over 1.8 million people, have formed a coalition with resolutions against the spray. Over 20,000 citizens have already signed petitions to stop the spray. All this despite the CDFG awarding a no-bid contract for close to one half million taxpayer dollars (from the USDA) to a high-powered PR firm, Porter Novelli, to convince the public that this spray is safe and necessary. (After the Associated Press exposed Schwarzenegger's ties to Porter Novelli, the CDFG began the process of suspending the contract after already spending close to \$100,000.<sup>22</sup>)

### **CASS Law Suit**

In November 2007, a team of lawyers with CASS came together to develop a strategy to ensure not only that this eradication program would be permanently stopped, but to set a precedent for the future so that no one in California would have to be exposed to this kind of governmental over-reaching and abuse of power.

The lawsuit that CASS has structured tackles areas of law that are unique to all the other suits. If successful, it will prevent this program from continuing, and benefit not only people in Santa Cruz or Monterey, but throughout all of California. The case is being filed against USDA, EPA, CDFG and APHIS.

## **SOLUTIONS**

With so much confusion, suffering and conflict around this issue, it can seem as if there is no positive resolution. On deeper inspection, however, there are simple, effective, sustainable, just and inexpensive resolutions to the issues at hand. We can keep people safe, support healthy food growing and farmer's revenue and restore our unalienable and constitutional rights. After six months of investigation and extensive consultation with growers, doctors, scientists, business people, legislators, lawyers and many others, here is what we propose:

- 1) **Re-classify the LBAM as an established, non-eradicable species.** This lifts the so-called "State of Emergency."
- 2) **Lift the quarantines both here and abroad.** The re-classification allows the USDA to make this change. Mexico, Canada, New Zealand and Australia have been primarily led by US trade policy in this matter, and have expressed a willingness to lift theirs if the US initiates it.
- 3) **Stop the aerial and ground spraying.**
- 4) **Implement safe alternatives, IF control is necessary.** Manage moth populations, if there becomes a proven imbalance, with the same best integrated pest management methods recommended by scientific experts and proven effective in New Zealand.<sup>23</sup>
- 5) **Subsidize the transition,** with some of the funds originally intended for spraying, for farmers implementing integrated pest management and ecologically sound planting practices.
- 6) **Eliminate CDFA's requirements for toxic organophosphate controls for LBAM in nurseries.**
- 7) **Require CDFA to recalculate potential agricultural impact of LBAM** in California using recent New Zealand data (taken after the use of organophosphates was discontinued).
- 8) **Require CDFA to calculate, disclose and discuss with the public both short and long term potential economic impacts on all affected parties** of any pest management treatment in order to come to wise, healthy and inclusive decisions.
- 9) **Require CDFA or Homeland Security to monitor borders carefully for LBAM.**
- 10) **Enforce government protection** of the already-existing local, state and federal laws as well as international ethical guidelines intended to protect our rights, health, safety, privacy and economic well-being.
- 11) **Create an Office of Environmental and Democracy Law Enforcement.** Establish this in the Attorney General's Office with equitable citizen and environmental expertise represented.
- 12) **Adopt the Precautionary Principle as a guiding law of the land -**  
"that the burden of proof falls on those who would take an action that carries risks to health and the environment."<sup>24</sup>
- 13) **Push for passage of bills into law which:**
  - align all relevant policies with the Precautionary Principle
  - uphold our fundamental constitutional rights.
- 14) **Begin the Initiative process,** if necessary, to ban all application of pesticides on non-agricultural land without full and informed consent of residents and local governments.
- 15) **Begin recall petitions, if necessary,** for all political representatives who do not uphold laws intended to protect the health and safety of citizens and the environment as represented in the US and CA constitutions and the CA codes.
- 16) **Use the media** and all other necessary methods to inform fellow residents of this violation and the need to stop it.

- 17) **Communicate relentlessly with representatives and bureaucrats** who are responsible for or can do something about stopping the spray.
- 18) **File and win all possible and necessary law suits** - City, County, Federal, International.
- 19) **Create coalitions of city governments and Boards of Supervisors** who have passed resolutions against the spray. (Nineteen cities and two counties have already joined the Coalition of California Cities to Stop the Spray as of April 30, 2008)
- 20) **Create new city ordinances to supersede corporate rights**, (already done in other cities.)<sup>25</sup>
- 21) **Create new administrative rulemaking to provide “Urgency” funding for control, suppression, management and monitoring of LBAM and other pests** so that such funds are not just available for “Emergency” or eradication programs.

(See Appendix F for Notes on Solutions)

Until the spray is stopped, some personal actions which you can take are:

- 1) **Keep expanding the electronic and phone network** of concerned citizens to organize future response teams and alliances as needed.
- 2) **Join the CASS Email list** to receive weekly notices of important events and information at <http://cassonline.org>
- 3) **Participate with a CASS Action Team** in your area. <http://www.cassonline.org/teams.html>
- 4) **Make tax-deductible donations** to support the CASS law suit and other activities.  
CASS: California Alliance to Stop the Spray, 200 Washington St, Suite 107, Santa Cruz, CA 95060 (please make checks payable to CASS and include your return address for a tax deductible receipt)  
Or use Paypal at <https://www.paypal.com/cgi-bin/webscr>
- 5) **Get informed** at and send friends to: <http://www.lbamspray.com>
- 6) **Watch and share the science of LBAM Video** at:  
[http://www.youtube.com/watch?v=2Zc7I\\_o0M6E](http://www.youtube.com/watch?v=2Zc7I_o0M6E)
- 7) Sign the petition to stop the spraying at <http://www.lbamspray.com>
- 8) Circulate this and other papers from <http://cassonline.org/> and <http://www.lbamspray.com>

This report was a joint effort of the CASS Economics Action Team:  
Foster Gamble, Jerilyn Bock, Janis Knepp, Dennis Knepp and Glen Chase

**The MISSION of the California Alliance to Stop the Spray (CASS) is to** provide an organizational vehicle by which residents of the state protect their inalienable rights to safety and privacy, and to not have their persons or property, including public areas, sprayed with chemicals or any other substance.

CASS is a transpartisan organization committed to operating with fairness, integrity, and inclusiveness.

CASS works to reveal the full truth of the spraying and to inform and include all affected people to the greatest extent possible, so that the most healthy, equitable and wise solutions are achieved.

Working toward sustainable and ecologically sound solutions, CASS embraces the spirit of the “Precautionary Principle” - that if an action or policy might cause severe or irreversible harm to the public, in the absence of a scientific consensus that harm would not ensue, the burden of proof falls on those who would advocate taking the action.

## APPENDIX A CALCULATIONS OF ECONOMIC IMPACTS

### ESTIMATED POTENTIAL LOSSES TO 9 COUNTIES DUE TO LBAM

<http://www.visitcalifornia.com/media/uploads/files/FastFacts-06FINAL21.pdf>

(California Fast Facts, California Travel and Tourism Commission)

California is the most visited state in America. Tourism is San Francisco's #1 revenue producer. California earns \$88.1 billion in travel-related income each year (this is a 2005 stat).

This spending directly supported 911,800 jobs x 22% (total travel \$ percentage of 9 CA counties) = 200,596 jobs in **9 counties x 10% = 20,059 jobs**

*Actual 2004 figures for Total Travel Spending by targeted county:*

County	Travel Spending	Population
Alameda	\$2,470.3M	1,443,741
Contra Costa	1,071.7	948,816
Marin	596.6	247,289
Monterey	1,896.0	401,762
San Francisco	8,677.5	776,733
San Mateo	2,136.9	707,161
Santa Clara	3,201.6	1,682,585
Santa Cruz	573.1	255,602
Solano	506.8	394,542
	17,918.9	6,858,231

**10% loss on total Tourist Revenue of \$17,918.9M = \$1.791.89 M = \$1.8 Billion**

(9 Spray counties)

**1% loss = \$180 M (9 counties)**

Examples of potential lost revenue for individual counties:

San Francisco (2005)

At 7.37B x 10% = \$737 M

1% = \$73.7M

10% loss of 66,315 jobs in SF which are related to tourism would equal 6,632.

1% = 632 jobs lost

(<http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2006/05/13/BUG0TIR3FC37.DTL>)

Marin @ \$596.6M x 10% = 59.7M

1% = \$5.97M

Monterey \$1.89B x 10% = 189.6M

1% = \$18.9M

Santa Cruz 573.1M x 10% = 57.3M

1% = \$5.7M

**Monterey + Santa Cruz = 246.9M in losses**

**1% = \$24.7M**

**New travel and hospitality industry construction** was \$1.4 B in 2005.  
 10% of this, if lost due to spray would be **\$140M**. 1% would be **\$14M**

California earns \$9.9 billion in **TAX REVENUE** directly from tourism-related spending.  
 \$1.9B in **local taxes** (x 10% = \$190M x 22% = **41.8M**) (SC @ .5% of State tourist revenue = 9.5M x 10% = \$950,000),  
 and \$3.4B in **state taxes** (x 10% = 340M x 22% = **74.8M**) (SC @ .5% of State tourist revenue = \$17M x 10% = 1.7M  
 And 4.6B (x 10% = \$60M x 22% = **\$101.2M** (SC @ .5% = \$23M x 10% = \$2.3M) in **Federal taxes**.

Each county in California earns approximately \$1.3 billion (average) in travel expenditures by visitors each year.  
 Using an average 4% increase per year would extrapolate for 2007 to \$95B for California for an average of \$1.63B per county or, for the 9 sprayed counties, \$14.67B. An estimated 10% of this amount, if lost as revenue would be \$1.47B annually. This would probably be more like \$2B because of the disproportionate popularity for tourists of counties like Santa Cruz, San Francisco, Monterey and Santa Clara.

**Santa Cruz County 2007**

Organic Farming –

(2700 acres, 70 registered farms, Organic is 15% of Total Farming Revenue of \$414,267,000 = \$62,140,050)

\$6,214,005 (10% loss)  
 \$621,400 (1% loss)

[http://www.agdept.com/content/cropreport\\_06.pdf](http://www.agdept.com/content/cropreport_06.pdf)

Santa Cruz Agricultural Commission 2007 Crop Report

**Monterey County 2006**

(17,357 acres, 111 farms)

Total Organic Farming revenue = \$226,465,742 (increase of 8.5% over 2005)

\$22,646,574 (10% loss)  
 \$2,264,657 (1% loss)

<http://www.co.monterey.ca.us/ag/pdfs/cropreport2006.pdf>

Monterey Agricultural Commission 2006 Crop Report

+ 4,559 jobs (.5% of 911,800)

Nine Counties 10% of totals

Tourist Rev \$1,800,000,000  
 Tourist Const. 140,000,000  
 Local Tax loss 41,800,000  
 \$1,981,800,000  
 State Tax 74,800,000

Fed Tax loss    \$101,200,000  
                   \$2,157,800,000      Annual loss from decline in tourist industry at 10%

                  \$215,780,000      Annual loss from decline in tourist industry at 1%

+ 20,059 jobs

**POTENTIAL LOSSES IN REAL ESTATE VALUES DUE TO LBAM SPRAYING**

With a population of 255,602 in Santa Cruz, and estimating 3 persons per home, there would be 84,200 homes and

The **median** price was \$600,000 (599,000 in 2007) x 84,200 = 50,520,000 x 10% =

\$5,052,000,000. (**\$5.05 Billion loss in real estate value in Santa Cruz County** alone)

The **average** price for homes sold in 2007 was \$918,000 x 84,200 = \$77,348,561,180 x 10% =

\$7,734,856,118 (**\$7.7 Billion loss in real estate value in Santa Cruz County** alone)

Santa Cruz is by population 3% of the 9 counties scheduled for spraying. Many of these are far wealthier than SC so a direct extrapolation is probably conservative and gives us a potential loss in real estate value due to SBAM spraying alone in all nine counties of (.03X = 5.05B so X =) **\$168.33Billion** loss in real estate value in all nine sprayed counties.

**POTENTIAL LOSSES TOTALS**

		<b>LBAM</b>			
<b>SANTA CRUZ COUNTY</b>		<b>ALL NINE COUNTIES</b>			
10%	1%	10%	1%		
Tourist, Construction & Tax					
\$64.5M	6.45M*	\$2B	200M*	ANNUAL	
Real Estate					
(\$5.05 B if Mean					
home price	(505M)	(\$168.33 B)	(16.8B)		
or \$7.07 if Average					
home price	707M*	257B	25.7B*		
<hr/> \$7.1B	<hr/> 713.5M	<hr/> 259B	<hr/> 25.9B		

**POTENTIAL LOSSES IN REAL ESTATE COMMISSIONS  
 DUE TO LBAM SPRAYING**

Santa Cruz County

Sales in 2007 = \$1.07B x 5% (commission) = \$53,500,000 x 10% = \$5.35M

X 1% = \$535,000

Santa Cruz is by population .03% of the total of all nine targeted counties

Extrapolating to **all nine counties**, lost commissions could be

.03 X = \$5,350,000

X = **\$178,000,000 at 10%**

Or **\$17.8 M at 1%**

## APPENDIX B

### FAULTY ECONOMICS IN USDA/C DFA CALCULATIONS OF POTENTIAL CROP LOSSES TO CALIFORNIA AGRICULTURE

Most of the justification for possible alleged economic losses due to the light brown apple moth (LBAM) in California cited by the USDA and CDFA, was from outdated Australian statistics for the years 1993-1994. This data was taken from one report titled "Pests and Pest Management Impact on Climate Change – A Report for Rural Industries Research and Development Corp." by Dr. Robert Sutherst, Entomologist, report date 2/2000.

The following State and Federal agencies used the same identical information from the Sutherst report for the years 93/94 in all of these reports regarding LBAM eradication program as the basis and justification for possible economic damage to California crops:

- 1) CDFA- document titled, "Finding of Emergency" March 21, 2007.
- 2) CDFA – document titled, "Dept. of Food and Agriculture Proposed Changes in Regulations. March 21, 2007.
- 3) LBAM Act Senate Bill #556 – Effective 9/7/07.
- 4) USDA-APHIS-PPQ-FERAL – "Economic Analysis: Risk to US Apple, Grape, Orange and Pear Production from Light Brown Apple Moth" 11/07.
- 5) CDFA "Proclamation of an Eradication Project against the Light Brown Apple Moth" dated 9/28/07.

Sutherst used statistics from the Australian Bureau of Statistics for two years – 1993/94 - to project likely impacts of climate change on two pests – LBAM and Queensland fruit fly. This report stated that the growers of apples, oranges, pears and grapes spent a total of \$17,310,000 on LBAM but this was mostly for research and control. Only about 11% (\$1,973,000) of the total costs of production was attributable to actual crop damage caused by LBAM. These statistics were absent from all of the USDA/C DFA reports.

Relevant to this discussion, but obviously missing from all of the five US reports listed above, was Sutherst's conclusion that the government of Australia had very modest expenditures on LBAM and the majority of expenditures were for research.

Almost the exact identical statement below (taken from the Sutherst report), was found in the five CDFA, USDA and LBAM Act documents above:

"It was estimated for Australia that LBAM causes AU\$21.1 million annually (*which is actually 12.4M in American dollars*) in lost production and control costs, or about 1.3% of gross fruit value for apples, pears, oranges and grapes when compared with 1993/1994 gross fruit value of \$1.633 billion." This exact statement was used in USDA/C DFA reports except for the last line – "when compared with 1993/1994 gross fruit value of \$1.633 billion." Why was this line excluded with reference to the years 1993/1994?

Based on the Australian economic data from the Sutherst report for the years 1993/1994, the government documents listed on page 1 concluded the following:

"Applying this percentage to 2005 gross value of these same crops in CA of \$5.4 billion (USDA 2006), the estimated annual production costs would be \$70.2 million. Additional costs for other fruit crops would add additional costs of \$63.1 million based on their 2005 gross value of \$4.8 billion. Therefore total lost production and control costs could be \$133 million for all crops." Words like could, would, imply pure speculation.

*However, if we use the same Sutherst figures which showed only 11% of total production costs for LBAM was attributable to actual crop damage, the actual estimated damage from LBAM in California could be \$14 million instead of \$133 million. And this is based on the assumption that we would have the same total expenditures for LBAM in California that were found in Australia for the reported years 1993-1994. This was a huge assumption to make based on inadequate, inconclusive Australian data, when they were extensively using organophosphate pesticides which tend to wipe out beneficial predators and induce pest imbalance. (Even if we used the \$160M - \$640 million figures that El Lissy (USDA) and Kawamura (CDFA) began using later, calculating 11% of that would still have crop damages at \$17.6 - 70.4M, because the remainder, according to their own out-dated data, would have been research and treatment.)*

In an Environmental Assessment report of September 2007, Osama El-Lissy, the Director of the U.S. Dept of Agriculture Emergency Management Office, gives some very large values for the potential cost of crop damage from the light brown apple moth. In the third paragraph on page 9 of his report he makes the claim of \$640M for the cost of crop damage and control costs in the eleven coastal counties affected so far by the LBAM. He goes on to claim a California cost of up to \$2.4 billion annually if the LBAM spreads throughout the State.

These costs are inaccurate. First compare the cost to the total value of all California agricultural exports. In that same paragraph, El-Lissy states that the total value of California agricultural commodities shipped around the world in 2003 was \$7.2 billion. The amount of \$2.4B is one-third of the total value of all California agricultural products. The percentage of the LBAM cost relative to the total value of the agricultural products is inaccurate.

The Australian report by Dr. Robert Sutherst entitled “Pests and Pest Management, Impact of Climate Change” states that the cost of LBAM control, quarantine, and research is only 1.3 percent of the gross fruit value (page 17). The Sutherst report should be well known by Mr. El-Lissy and his staff. Using the value of 1.3 percent gives a cost of \$93M for all costs to the state of California for LBAM control, not \$2.4 billion. This works out to less than \$3 dollars each for the 36 million people living in California.

USDA/CDFR are planning on spending approximately \$100M – 500M just on spraying – which won’t eradicate the moth, and the moth has done no damage.

## APPENDIX C

### A LISTING OF LEGAL AND MORAL VIOLATIONS

by USDA and CDFA in actions taken to eradicate LBAM:

1) United States Constitution

“...No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; **nor shall any State deprive any person of life, liberty, or property**, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.”

Article XIV

2) California State Constitution – The very document that creates the state of California, Guarantees safety for its residents:

**“All people are by nature free and independent and have inalienable rights. Among these are enjoying and defending life and liberty, acquiring, possessing, and protecting property, and pursuing and obtaining safety, happiness, and privacy.”**

Article 1 DECLARATION OF RIGHTS - Section 1

3) **“The people have the right of access to information concerning the conduct of the people’s business, and, therefore, the meetings of public bodies and the writings of public officials and agencies shall be open to public scrutiny.”**

CA Constitution, Article, 1, Section 3(b)(1)

4) California Code requires **consent before spray**:

**“No person shall directly discharge onto a property without consent of the owner or operator of the property.”**

California Code, Division 6, Chapter 3, subchapter 2, Section 6616

5) California Code requires **protection of persons, animals and property**

b) Notwithstanding that substantial drift would be prevented, **no pesticide application shall be made or continued when:**

- 1. There is a reasonable possibility of contamination of the bodies or clothing of persons not involved in the application process;**
- 2. There is a reasonable possibility of damage to nontarget crops, animals or other public or private property; or**
- 3. There is a reasonable possibility of contamination of nontarget public or private property, including the creation of a health hazard, preventing normal use of that property.**

California Code, Division 6, Chapter 3, subchapter 2, Section 6614

6) CEQA – California Environmental Quality Act

**Protection of the environment consistent with the provision of a decent home and suitable living environment for every Californian shall be the guiding criterion in public decisions.**

CA. Public Resources Code, Div 13, Environment.

This section states that it is necessary to provide a high-quality environment that at all times is healthful and pleasing to the senses and intellect of man. It further states that **governmental agencies at all levels are required to consider qualitative factors, as well as economic and technical factors, and long-term benefits and costs, in addition to short-term benefits and costs and to consider alternatives to proposed actions affecting the environment.**

7) Further, Title 14, California Code of Regulations, Chapter 3. Guidelines for Implementation of the California Environmental Quality Act, Article 18. Statutory Exemptions, Section 15269. Emergency Projects.

“The following emergency projects are exempt from the requirements of CEQA: Specific actions necessary to prevent or mitigate an emergency. **This does not include long-term projects undertaken for the purpose of preventing or mitigating a situation that has a low probability of occurrence in the short-term.**”

An emergency is defined as: “A sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to life, property, or essential public services. **“Emergency” includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage**”

The Legislature had a chance to exempt CDFA from CEQA and purposefully chose not to do so. The legislature desired full CEQA review of projects undertaken to eradicate LBAM.

8) **Thematic Strategy on the Sustainable Use of Pesticides Expert Meeting on Aerial Spraying Minutes of the Meeting, March 31, 2004, European Commission\***, wherein the Commission states that, due to inherent high risk (in particular from spray drift), **aerial spraying should be banned**...and would require member states to severely restrict or ban aerial spraying when the conditions for safeguarding bystanders or the environment cannot be fulfilled [**and this statement was made in consideration of aerially spraying crops, not human populations**]

The *Precautionary Principle* is the guiding hand in the European Union’s response to pesticides and genetically modified foods and animals, and is a reason U.S. agricultural products are rejected in these countries. The European Union Commission Communication notes “The Precautionary Principle applies where scientific evidence is insufficient, inconclusive or uncertain and preliminary scientific evaluation indicates that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health, may be inconsistent with the high level of protection chosen by the EU.”

9) **CDFA has not yet obtained clearance to begin spraying from the US Fish and Wildlife Service as it relates to the impact of spraying on endangered species.**

APHIS has designated CDFA to find out if endangered species would be affected, also to see if minority populations and EO 13045, Protection of children from environmental risks is violated. NOT A THIRD PARTY, INDEPENDENT, UNBIASED AGENCY, APHIS and CDFA and EPA and USDA are all committed to this assault on citizens to further limit competition of interstate and foreign commerce, all components defined as violations under the RICO Act.

10) **CDFAs' actions act as a nuisance and a trespass** (County of Santa Cruz vs CDFAs Superior Ct. of California. County of Santa Cruz Case No. 158516, Oct. 31, 2007) Officials would uphold laws to forcefully blunt citizen nuisance and trespass on their homes and their properties. There would be no equal application of enforcement.

11) **CDFAs has yet to provide the public with evidence of a permit from the Monterey Bay Marine Sanctuary.** Undersecretary Gomes states that "The Department will not apply pesticides to water bodies, riparian habitat areas or areas lacking host insects.

12) **CDFAs refuses to answer questions from citizen interest groups and legislators in compliance with CPRA and FOIA in a timely and complete manner, if at all.**

13) Section 18 of the **Federal Insecticide, Fungicide, and Rodenticide ACT (FIFRA)**, EPA regulation 40 CFR Part 166 (ref. 10) **has not approved pheromone products for chronic or repeated use or for aerial spraying or in any preparation, micronized or aerially delivered, even in times of true emergencies...**

14) **The Americans with Disabilities Act protects people with chemical sensitivities and other disabilities from discrimination.**

From: <http://www.healthcentral.com/asthma/index-3259-149.html> The Americans with Disabilities Act (ADA) is a civil rights law that gives you the right to ask for changes where policies, practices or conditions exclude or disadvantage you. As of January 26, 1992, public entities and public accommodations must ensure that individuals with disabilities have full access to and equal enjoyment of all facilities, programs, goods and services. The ADA borrows from Section 504 of the Rehabilitation Act of 1973. Section 504 Prohibits discrimination on the basis of disability in employment and education in agencies, programs and services that receive federal money. The ADA extends many of the rights and duties of Section 504 to public accommodations such as restaurants, hotels, theaters, stores, doctors' offices, museums, private schools and child care programs. They must be readily accessible to and usable by individuals with disabilities. No one can be excluded or denied services just because he/she is disabled or based on ignorance, attitudes or stereotypes.

**Does the ADA Apply to People with Asthma and Allergies?**

Yes. In both the ADA and Section 504, a person with a disability is described as someone who has a physical or mental impairment that substantially limits one or more major life activities, or is regarded as having such impairments. Breathing, eating, working and going to school are "major life activities." **Asthma and allergies are still considered disabilities under the ADA, even if symptoms are controlled by medication.**

... Under Section 504, public schools and programs cannot avoid their responsibility by claiming to have limited funds or resources. Nor can they impose a "disparate impact" on people with disabilities. The ADA requires public accommodations to make changes, except in cases where an "undue burden" would result.

This program violates the intent of the **Light Brown Apple Moth Act (2)(C)** which states, **"Eradication activities undertaken pursuant to this article shall comply with all applicable laws and regulations and shall be conducted in an environmentally responsible manner."**

If the CDFA had been operating in an “environmentally responsible manner,” they would have allowed the necessary environmental impact reports to supersede their aerial pesticide spraying program. Instead, the State used its powers to push through a totally unproven, unsubstantiated false “emergency” in order to intentionally evade all environmental impact reports and spray residential areas with an untested pesticide that made hundreds of people sick. Damage to the environment, like the deaths of hundreds of birds from a “mystery oil” spill, and the worst “red tide” in the history of California, which made many surfers sick, were also the result of this careless act by the State.

**Secretary Kawamura of the CDFA appears to have a different definition of an “emergency” from that of a reasonable person when referring to a tiny light brown apple moth. Kawamura declared,** “This emergency (LBAM) clearly poses such an immediate, serious harm that *delaying action by providing five working days advance notice to allow public comment would be inconsistent with the public interest.* This emergency action is to avoid serious harm to the public peace, health, safety or general welfare.”\*

There definitely IS an emergency. But it’s the one created by the CDFA and Kawamura, supported by the USDA, APHIS and Governor Schwarzenegger, perpetrated against the people without their consent, endangering our health and safety, and without protection of the communities and environment being aerially assaulted with pesticides.

### **International Environmental and Human Rights Advisory Report**

[http://www.lbamspray.com/00\\_Documents/2008/EHRA.pdf](http://www.lbamspray.com/00_Documents/2008/EHRA.pdf)

Some of the international human rights norms and documents that apply in the assault on privacy, health and human rights by the USDA and the CDFA.

Daniel Taillant, Director of the Human rights and the Environment wrote:

“Most of our basic human rights are affected by environmental degradation. The *right to health* is affected by environmental abuse, such as water, air, and noise contamination. The *right to property* is often violated by commercial exploitation... The *value of our property* is also affected by environmental pollution. The *right to equality* is greatly affected by the unequal burden shared by certain sectors of society who are the targets of environmental contamination...everything and anything that influences the environment directly influences our human condition, and *a violation of the environment is a violation of our human rights.*”

#### **15) Right to life, liberty and security of person.**

**“Everyone has the right to liberty and security of person.”**

UDHR - Universal Declaration of Human Rights

<http://www.un.org/Overview/rights.html>

CCPR – International Covenant on Civil and Political Rights

[http://www.unhchr.ch/html/menu3/b/a\\_ccpr.htm](http://www.unhchr.ch/html/menu3/b/a_ccpr.htm)

#### **16) Right to privacy and home**

“No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence...”

UDHR Article 12

CCPR Article 17

(This entails the right to be secure in your home, to be able to enjoy the use of your property and to not have one's property devalued as a result of state actions.

**17) Right to property**

UDHR Article 17

“No one shall be arbitrarily deprived of his property.”

**Duty to protect the child** (i.e. persons under age 18)

**“States Parties shall take all appropriate legislative, administrative, social and educational measures to protect the child from all forms of physical or mental violence, injury or abuse, neglect or negligent treatment, [or] maltreatment...”**

CRC Article 19 - Conventions on the Rights of the Child (1990)

<http://www.unhchr.ch/html/menu3/b/k2crc.htm>

**“Special measures of protection and assistance should be taken on behalf of all children and young persons without any discrimination for reasons of parentage or other conditions.”**

CESCR – International Covenant on Economic, Social and Cultural Rights

[http://www.unhchr.ch/html/menu3/b/a\\_cescr.htm](http://www.unhchr.ch/html/menu3/b/a_cescr.htm)

**Right of the child to the highest standard of health**

**“State Parties recognize the right of the child to the enjoyment of the highest attainable standard of health.”**

CRC Article 24

**18) Duty to encourage school attendance**

**“States Parties shall take measures to encourage regular attendance at schools.”**

CRC Article 28, 1 (e)

(Average attendance in six monitored Santa Cruz County High Schools all more than doubled their absences in the three days immediately following the November aerial spray.\*)

**19) Right to compensation**

In 1985 the UN General Assembly spelled out the nature of indemnification in the Declaration of Basic Principles of Justice for Victims of Crime and Abuses of Power.

[http://www.unhchr.ch/html/menu3/b/h\\_comp49.htm](http://www.unhchr.ch/html/menu3/b/h_comp49.htm)

This declaration insists that **“victims are entitled to prompt regress for the harm that they have suffered” and that offenders should “pay fair restitution to victims, their families and dependents.”**

**20) Right to know**

**21) Right to participation in decision-making in environmental issues**

The Rio Declaration on Environment and Development\* establishes citizens' right to information about environmental toxics to which they may be exposed and to participate in the decision making process.

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=78&ArticleID=1163>

**“Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous material and activities in their communities, and the opportunity to participate in decision-making processes.”**

Rio Declaration on environment and Development - Principle 10

**22) Right to equal protection of the law**

**“All persons are equal before the law and are entitled without any discrimination to the equal protection of the law.”**

CCPR Article 26

**23) In August 2005, Congress enacted a moratorium on EPA use of human pesticide experimentation until strict ethical standards were established. The intent of this moratorium was to protect pregnant women and infants from any sort of testing.** “Such rules shall not permit the use of pregnant women, infants or children as subjects; shall be consistent with the principles proposed in the 2004 report of the National Academy of Sciences on intentional human dosing and the principles of the Nuremberg Code with respect to human experimentation...EPA will neither conduct nor support any intentional dosing studies that involve pregnant or nursing women or children for all substances EPA regulates.” **The Federal “Common Rule” created requirements for the protection of human subjects from experiments done by the EPA and the USDA.** <http://www.hhs.gov/ohrp/policy/common.html>  
<http://www.ens-newswire.com/ens/jan2006/2006-01-25-05.asp>.

**24) FEDERAL AVIATION ADMINISTRATION - Planes are restricted to flying above 1000ft when over urban populations.\*** The CDFA itself admits that the planes from Dynamic Aviation have been flying as low as 500ft.

**25) There are legal precedents in the Malathion case** that should further help protect us from such a violation. The first successful lawsuit involving property damages resulting from the aerial spraying of malathion as part of the 1997 Medfly Eradication Program was settled in the Tenth Judicial Circuit court in Polk County, Florida, in May 2000. (230 people reported getting sick)

In April 2007, a federal judge signed a settlement agreement in which New York City admits that the pesticides it sprayed may indeed be dangerous to human health as well as to natural environment. Mayor Rudolf Giuliani and other City officials had claimed that the spraying was safe. Damages were paid to five grassroots environmental and wildlife rehabilitation groups. The plaintiffs in the lawsuit were the No Spray Coalition, Beyond Pesticides, Disabled in Action and Save Organic Standards.

**26) A 1991 Supreme Court decision (Wisconsin Public Intervenor c. Mortier 90-1905) ruled that the Federal law regulating the manufacture, sale and use for pesticides permitted local governments to impose more stringent regulations of their own.**

27) The CDFA's aerial pesticide spraying program over heavily populated residential neighborhoods also violates the intention of two Executive Orders:

**1. EO 12898\*: Federal Actions to Address Environmental Justice in Minority Populations and low-income populations. The order was to prevent minority, low-income communities from being subjected to disproportionately high or adverse human health or environmental effects.**

The CDFA appears to have been selective in the areas they sprayed, by excluding communities where mostly wealthy people live. In Monterey County, most of Carmel, all of Carmel Valley, the exclusive gated enclaves of Monterra and Tehama and a portion of Pebble Beach, including the Lodge and Golf Course, were not sprayed. In Santa Cruz County, most of Rio Del Mar, Seascap, most of the UCSC campus, and ocean front properties were not sprayed. Clearly, there is a pattern documented on the CDFA's own aerial spraying maps of not spraying some wealthy communities.

Were the rich communities with political clout intentionally not screened for moths so that these communities would not be sprayed? No traps equals no moths caught which equals no spraying. While information on placement of traps is public record, and has been posted on other county's websites, like Sonoma County, our County Agricultural Commissioners refuse to tell us where the traps were placed. If this was not intentionally done to protect the wealthy communities, why won't the CDFA release trap placement information to the public?

By withholding public information about all other details of the aerial pesticide spraying program, like proof of an economic emergency and placement of moth traps, the CDFA has also violated the following State Constitutional right:

28) The second Executive Order violated by the CDFA is the following:

**2. EO 13045\*: Protection of Children from Environmental Health Risks and Safety Risks: This Federal Order states that children may suffer disproportionately from health and safety risks. This EO requires each Federal Agency (USDA, APHIS, EPA, etc) to identify, assess and address environmental health and safety risks that may disproportionately affect children.**

Where are those government assessments of health and safety risks to children?

The USDA's conclusion regarding this EO was that, since aerial spraying will be conducted overnight when children are inside, and since "pheromones" (no mention of the total Checkmate pesticide product) minimizes the risks to children, no other assessments were needed. It's again obvious that these federal agencies also violated the provisions of this Executive Order.

## **DEFICIENCIES IN THE FEDERAL REGULATION OF CHEMICALS**

The Toxic Substances Control act of 1976 (TSCA)

[http://en.wikipedia.org/wiki/Toxic\\_Substances\\_Control\\_Act](http://en.wikipedia.org/wiki/Toxic_Substances_Control_Act)

is the only law that is intended to enable regulation of chemicals both before and after they enter commerce. And studies concluded that TSCA has not served to assess the hazards of chemicals or control those of great concern. TSCA DOES NOT REQUIRE chemical producers to disclose information on the health and environmental safety of these chemicals or on the approximately

2,000 new chemicals that enter the market each year. TSCA places legal and procedural burdens on the EPA. Since 1979 the EPA has used its authority to restrict only five chemical or chemical classes, though the agency reported in 1994 that about 16,000 chemicals in the U.S. were of some concern on account of their structure and volume in commerce.

**EPA requires very little testing for the potential hazards of the combination of active and inert ingredients, even though humans and the environment are actually exposed to a chemical cocktail when a pesticide is used.** Of the over 2300 substances EPA has identified as “inerts” in pesticide products, EPA classifies more than 1700 as “unknown toxicity” because EPA’s Office of Pesticide programs does not have adequate information about their hazards. USAEPA 1998 List of inert pesticide ingredients [www.epa.gov/opprd001/inerts](http://www.epa.gov/opprd001/inerts)

The scale of chemical product is immense and will continue to expand globally. Many chemicals that are useful to society are also hazardous to human biology and ecological processes. The EPA found just under 700 such chemicals in the blood of a nationwide survey of Americans in 1987. Animal studies indicate that these chemicals can disrupt the development of organ systems of fetuses and infants at very low doses.

In 2006 the European Parliament passed the REACH law, or Registration, Evaluation, Authorization, and Restriction of Chemicals. REACH requires a toxicity assessment of all those chemicals that are already on the market that have never been tested and plugs the loophole left open by TSCA. REACH also requires all chemicals manufactured or imported into the EU will have to be registered with the ECHA, European Chemicals Agency in Helsinki. U.S. citizens will have access to these databases and get a first-ever look at the potential health effects of some toxins. Will the US become a dumping ground for hazardous chemicals if it’s cheaper for manufacturers to keep making the more toxic version of a product for use here in the U.S.?

Just recently, Deborah Rice, an employee of the Maine Department of Health and Human Services was dismissed by the EPA from a toxicology review panel that was reviewing the safety of diphenyl ether (PBDE) also known as “deca.” Rice was previously a recipient from the EPA of an award for “exceptionally high-quality research.” The agency was pressured to remove her from the panel, which she had been selected to chair, by a lobbying group, the American Chemical Council. Apparently the group did not like her concerns about the toxicity of the chemical and the costs to the electronics industry if it were to be banned. The scary implication of this and other similar cases is that the EPA’s first allegiance is to industry profits rather than to citizens’ health and that any expert who dares to say that toxic chemicals should be banned is removed from advisory panels. <http://www.naturalnews.com/z022773.html>

In 2006, six groups including the Pesticide Action Network and Physicians for Social Responsibility sued the EPA in the Second Circuit Court of Appeals in New York City and the Ninth Circuit Court of Appeals in San Francisco for creating **a new rule allowing pesticide companies to use intentional tests on humans to justify weaker restrictions on pesticides.** They contended that the agency’s human testing rule violates a law passed by Congress in 2005 mandating strict ethical and scientific protections for pesticide testing on humans. <http://newstandardnews.net/content/index.cfm/items/2864>

## APPENDIX D

### PENALTIES FOR MEDICAL EXPERIMENTATION WITHOUT INFORMED CONSENT

California code (as well as the internationally signed and recognized Nuremberg Code) declares it is illegal to conduct medical experiments on people without their informed consent. The Environmental Protection Agency has acknowledged that the particulates in CheckMate chemicals are small enough to penetrate the body and have not been tested on humans, which means that the LBAM spray “program” qualifies as a medical experiment. Violations incur significant fines. Each person violated counts as a separate offense.



If penalties were enforced for conducting medical experiments on 1% of the population in all nine targeted counties, the penalties would be

\$680M (at 1%) per perpetrator  
or, at 10%, they would total approximately \$6.8B

These penalties also carry jail time for those responsible, including representatives of pharmaceutical companies. These numbers quickly mount into the thousands of years.

#### REFERENCES AND CALCULATIONS

##### **Right of experimental subjects to free and informed consent**

**“The voluntary consent of the human subject is absolutely essential.”**

Nuremberg Code item 1

**“The human subject should be at liberty to bring the experiment to an end if he has reached the physical or mental state where continuation of the experiment seems to him to be impossible.”**

Nuremberg Code item 9

The Nuremberg Code (1940) International Principles for Human Experimentation (From Council Law No. 10, Nuremberg., Oct. 1946-April 1949, Wash. D.C.: USGPO. For Full Code:

<http://ohsr.od.nih.gov/guidelines/nuremberg.html>

(The *Nuremberg Code of Ethics* in Medical Research and the *Declaration of Helsinki* have not been encoded into law and are therefore non-enforceable)

The aerial application of pesticides is not just a pesticide experiment, but under State and Federal Laws, a medical experiment.

Aerial applications fall under the legal definition of a human experiment under the California Health and Safety Code, section 24170-24179.5, and also falls under the legal definition of a drug. The CH&S Code defines **a medical experiment to include a biological substance or organism that can penetrate or damage human tissues. Checkmate formulations and Bt, Bacillus thuringiensis, a bacterium, are biological substances or organisms.** **The Federal Food Drug and Cosmetic Act (Section 201(g)(1). Aerial application of the pheromone pesticide chemical compound mixture constitutes human pesticide and medical experimentation.**

### **PROTECTION OF HUMAN SUBJECTS IN MEDICAL EXPERIMENTS ACT**

State of California, USA, Chapter 1.3 Human Experimentation

The subject shall:

- Be given an explanation of the procedures to be followed in the medical experiment, and any drug or device to be utilized.
- Be given a description of any attendant discomforts and risks reasonably to be expected from the experiment.
- Be given a disclosure of any appropriate *alternative procedures, drugs or devices* that might be advantageous to the subject, and their relative risks and benefits.
- Be given an *opportunity to ask questions* concerning the experiment or procedures involved.
- Be instructed that *consent to participate in the medical experiment can be withdrawn at any time...*
- Be given a copy of the signed and dated written consent form...
- Be given the *opportunity to decide to consent or not to consent* to a medical experiment without the intervention of any element of force, fraud, deceit, duress, coercion, or undue influence on the subject's decision.

**“Informed consent”** means the authorization given pursuant to Section 24175 to have a medical experiment performed after each of the following conditions have been satisfied:...

**“Medical experiment”** means:

- a. The severance of, *penetration or damaging of tissues* of a human subject or the use of a drug or device, as defined in Section 109920 or 109925, electromagnetic radiation, heat or cold, or a biological substance or organism in or upon a human subject in the practice or research of medicine in a manner not reasonably related to maintaining or improving the health of the subject or otherwise directly benefiting the subject.
  - b. The investigational use of a drug or device....
24176. Violations; damages; misdemeanor; waiver of rights
- a. Any person who is primarily responsible for conduct of a medical experiment and who negligently *allows* such experiment to be conducted without a subject's informed consent, as provided in this chapter, shall be liable to such subject in an amount not to exceed one thousand (\$1,000) as determined by the court.
  - b. **“willfully fails to obtain** the subject' informed consent” = \$5,000
  - c. **“willfully fails to obtain... and thereby *exposes a subject to a know substantial risk of serious injury, either bodily harm or psychological harm*”** = \$10,000



## APPENDIX E

### HISTORY OF COVERT TESTING OF CHEMICALS ON HUMANS



The CDFA and USDA are asking us to just trust their unsubstantiated claim that the chemicals they intend to immerse us in from airplanes for years are safe. They say the Environmental Protection Agency (EPA) assures that the ingredients are safe. Is that wise to trust them to regulate what is in our air for the next 3-19 years? Should we be suspicious of untold dangers in addition to the violation of our rights to privacy and safety?

In the last 100 years there were over 30 documented cases of US Government agencies, including the USDA, EPA, Army, Navy, CIA, Department of Defense and others, intentionally testing harmful chemicals *covertly* on human populations – at least fourteen of which involved *aerial spraying*. At least three were over the San Francisco Bay Area.

Particularly relevant is the case in 1994, when U.S. military aircraft began dropping a gel substance on the tiny town of Oakville, California, near the Pacific coast. Everybody in town came down with flu and pneumonia-like symptoms. Some people were hospitalized and remained ill for months. Pets and barnyard animals died. The gel material was tested by a number of labs which found human blood cells and nasty bacteria, including a modified version of *pseudomonas fluorescens*, cited in over 160 military papers as an experimental biowarfare bacteria.

In addition to the Medfly/Malathion spray program, which caused many illnesses and for which the State was successfully sued in a class-action suit, the USDA claimed with certainty that its chemical DDT would not contaminate the wildlife and marine ecosystems. The USDA now admits it does.

The USDA said the fertilizer nitrates used on large farms would increase crop yields, and they would never reach groundwater aquifers. Today the USDA admits that nitrates have seeped into and blighted potable water supplies in dangerous concentrations.<sup>26</sup>

When Stewart Resnick was confronted by CASS volunteers about the danger of aerial spraying of Checkmate, he responded, “Talk to the EPA. They have assured us it is safe”

#### **Environmental Protection Agency**

A sampling of recent EPA actions:

California Alliance to Stop the Spray  
www.CASSonline.org

2008: Environmental and farm worker advocates have sued the Bush administration, challenging the EPA's decision to reauthorize four previously banned pesticides on fruit and vegetable fields in California. An EPA spokesperson said "Our mission is to protect the environment and human health." An EPA lawyer said the agency found the four substances *posed risks to human health but concluded that their cost savings to growers outweighed the dangers.*

2008: EPA forced to cancel Children's Environmental Exposure Research Study (CHEERS) to pay poor families to test fluorinated pesticides on infants, but it will continue with funding from the American Chemistry Council

2008: The EPA dismissed an award winning neurotoxin specialist from a toxicology review panel (which she had been chosen to chair), in compliance with a request from the industry lobby group the American Chemical Council. Debra Rice had indicated that two PBDEs which had been banned after their rate of accumulation in human tissue had been linked to rising cancer rates. The ACC sought to set new maximums for safe exposure.

<http://www.naturalnews.com/z022773.html>

2008: EPA prohibits California from setting tougher vehicle emission standards

<http://www.commondreams.org/archive/2008/04/05/8111/print/>

Some other examples:

#### LISTS AND REFERENCES

##### Covert Chemical and Biological Experiments on People

[http://www.chemtrails911.com/docs/human\\_experiments.html](http://www.chemtrails911.com/docs/human_experiments.html)

1915: A doctor in Mississippi produced Pellagra in twelve white Mississippi inmates in an attempt to discover a cure for the disease.

1931: Dr. Cornelius Rhoads, under the auspices of the Rockefeller Institute for Medical Investigations, infects human subjects with cancer cells. He later goes on to establish the U.S. Army Biological Warfare facilities in Maryland, Utah, and Panama, and is named to the U.S. Atomic Energy Commission. While there, he begins a series of radiation exposure experiments on American soldiers and civilian hospital patients.

1940's: The U.S. government injected 12 human guinea pigs with uranium and plutonium without their knowledge as part of a Cold War-era radiation experiment. The 12 victims were injected during the 1940s -- 11 with plutonium, and one with uranium -- to see how the human body would react to an atomic bombing. The tests sprang from efforts to develop atomic weapons. At the time, scientists claimed that the people were terminally ill anyway and would not survive 10 years. But a number of them lived longer, and the plutonium is said to have caused urinary tract infections and painful osteoporosis, or thinning of the bones.

1940's: In an exceptionally large study at Vanderbilt University in the 1940s, approximately 820 poor, pregnant Caucasian women were administered tracer doses of radioactive iron. Vanderbilt worked with the Tennessee State Department of Health, and the research was partly funded by the Public Health Service.

1940: Four hundred prisoners in Chicago are infected with Malaria in order to study the effects of new and experimental drugs to combat the disease. Nazi doctors later on trial at Nuremberg cite this American study to defend their own actions during the Holocaust.

1942: Chemical Warfare Services begins mustard gas experiments on approximately 4,000 servicemen. The experiments continue until 1945 and made use of Seventh Day Adventists who chose to become human guinea pigs rather than serve on active duty.

1944: U.S. Navy uses human subjects to test gas masks and clothing. Individuals were locked in a gas chamber and exposed to mustard gas and lewisite.

1945: The Manhattan Project Program F is implemented by the U.S. Atomic Energy Commission (AEC). This is the most extensive U.S. study of the health effects of fluoride, which was the key chemical component in atomic bomb production. One of the most toxic chemicals known to man, fluoride, it is found, causes marked adverse effects to the central nervous system but much of the information is squelched in the name of national security because of fear that lawsuits would undermine full-scale production of atomic bombs.

1946: Patients in VA hospitals are used as guinea pigs for medical experiments. In order to allay suspicions, the order is given to change the word experiments to investigations or observations whenever reporting a medical study performed in one of the nation's veteran's hospitals.

1947: Colonel E.E. Kirkpatrick of the U.S. Atomic Energy Commission issues a secret document (Document 07075001, January 8, 1947) stating that the agency will begin administering intravenous doses of radioactive substances to human subjects.

1947: The CIA begins its study of LSD as a potential weapon for use by American intelligence. Human subjects (both civilian and military) are used with and without their knowledge.

1950: Department of Defense begins plans to detonate nuclear weapons in desert areas and monitor downwind residents for medical problems and mortality rates.

1950: In an experiment to determine how susceptible an American city would be to biological attack, the U.S. Navy sprays a cloud of bacteria from ships *over San Francisco*. Monitoring devices are situated throughout the city in order to test the extent of infection. Many residents become ill with pneumonia-like symptoms.

1951: Department of Defense begins open air tests using disease-producing bacteria and viruses. Tests last through 1969 and there is concern that people in the surrounding areas have been exposed.

1953: U.S. military releases clouds of zinc cadmium sulfide gas over Winnipeg, St. Louis, Minneapolis, Fort Wayne, the Monocacy River Valley in Maryland, and Leesburg, Virginia. Their intent is to determine how efficiently they could disperse chemical agents.

1953: Joint Army-Navy-CIA experiments are conducted in which tens of thousands of people in New York and *San Francisco* are exposed to the airborne germs *Serratia marcescens* and *Bacillus globigii*.

In 1953, a series of 36 tests was conducted on citizens of Winnipeg in Canada. Our government lied to the Winnipeg mayor, assuring him that the tests were non-toxic and defense-necessary. The actual purpose of these CIA-designed tests was to see how large a percentage of the population could be given chemical-induced cancer.

1953: CIA initiates Project MKULTRA. This is an eleven year research program designed to produce and test drugs and biological agents that would be used for mind control and behavior modification. Six of the subprojects involved testing the agents on unwitting human beings.

1955: The CIA, in an experiment to test its ability to infect human populations with biological agents, releases a bacteria withdrawn from the Army's biological warfare arsenal over Tampa Bay, Fl.

1956: U.S. military releases mosquitoes infected with Yellow Fever over Savannah, Ga and Avon Park, Fl. Following each test, Army agents posing as public health officials test victims for effects.

1960's: The Governments well kept secret Project Shad. Classified tests of Project Shad, show how the Marine jets came screaming out of the night off a remote Pacific atoll, spraying a 100-mile-long aerosol cloud over five tugboats. Then the men started getting sick. Pentagon: Chem, bio tests involved U.S. troops The USS George Eastman decontaminates after a nuclear test. The ship was used to monitor nuclear tests in the 1950s and for chemical and biological warfare tests in the '60s. WASHINGTON (CNN) -- The Pentagon revealed for the first time Thursday that almost 3,000 U.S. military personnel were involved in Cold War-era tests involving actual chemical and biological agents.

<http://www.cnn.com/2002/US/05/23/pentagon.chem.bio/index.html>

[http://www.signonsandiego.com/news/metro/20020715-9999\\_1m15gas.html](http://www.signonsandiego.com/news/metro/20020715-9999_1m15gas.html)

1965: Project CIA and Department of Defense begin Project MKSEARCH, a program to develop a capability to manipulate human behavior through the use of mind-altering drugs.

1965: Prisoners at the Holmesburg State Prison in Philadelphia are subjected to dioxin, the highly toxic chemical component of Agent Orange used in Viet Nam. The men are later studied for development of cancer, which indicates that Agent Orange had been a suspected carcinogen all along.

1970: United States intensifies its development of ethnic weapons (Military Review, Nov. 1970), designed to selectively target and eliminate specific ethnic groups who are susceptible due to genetic differences and variations in DNA.

1975: The virus section of Fort Detrick's Center for Biological Warfare Research is renamed the Fredrick Cancer Research Facilities and placed under the supervision of the National Cancer

Institute (NCI). It is here that a special virus cancer program is initiated by the U.S. Navy, purportedly to develop cancer-causing viruses. It is also here that retrovirologists isolate a virus to which no immunity exists. It is later named HTLV (Human T-cell Leukemia Virus).

Congressional hearings of 1975, 1977 and 1994 confirm that US Department of Health has used the American population as guinea pigs since WWII. Rutgers professor Leonard Cole collected from U.S. military records a horrifying list of biological and chemical agents furtively tested on American and Canadian civilian populations.

1977: Senate hearings on Health and Scientific Research confirm that 239 populated areas had been contaminated with biological agents between 1949 and 1969. Some of the areas included *San Francisco*, Washington, D.C., Key West, Panama City, Minneapolis, and St. Louis.

1987: Department of Defense admits that, despite a treaty banning research and development of biological agents, it continues to operate research facilities at 127 facilities and universities around the nation.

1990: More than 1500 six-month old black and hispanic babies in Los Angeles are given an experimental measles vaccine that had never been licensed for use in the United States. CDC later admits that parents were never informed that the vaccine being injected to their children was experimental.

1994: With a technique called gene tracking, Dr. Garth Nicolson at the MD Anderson Cancer Center in Houston, TX discovers that many returning Desert Storm veterans are infected with an altered strain of *Mycoplasma incognitus*, a microbe commonly used in the production of biological weapons. Incorporated into its molecular structure is 40 percent of the HIV protein coat, indicating that it had been man-made.

1994: U.S. military aircraft began dropping a gel substance on the tiny town of Oakville near the Pacific coast. Everybody in town came down with flu and pneumonia-like symptoms. Some people were hospitalized and remained ill for months. Pets and barnyard animals died. The gel material was tested by a number of government and private labs which found human blood cells and nasty bacteria, including a modified version of *pseudomonas fluorescens*, cited in over 160 military papers as an experimental biowarfare bacteria.

1994: Senator John D. Rockefeller issues a report revealing that for at least 50 years the Department of Defense has used hundreds of thousands of military personnel in human experiments and for intentional exposure to dangerous substances. Materials included mustard and nerve gas, ionizing radiation, psychochemicals, hallucinogens, and drugs used during the Gulf War .

1995: Dr. Garth Nicolson, uncovers evidence that the biological agents used during the Gulf War had been manufactured in Houston, TX and Boca Raton, Fl and tested on prisoners in the Texas Department of Corrections.

1996: Department of Defense admits that Desert Storm soldiers were exposed to chemical

agents.

1997: Eighty-eight members of Congress sign a letter demanding an investigation into bioweapons use Gulf War Syndrome.

1999: Ermina Cassani has investigated nation-wide reports of biological waste being dropped on neighborhoods from low-flying planes. Cassani investigated over 30 different yuk drops during the years 1998 and 1999. In 1998, she obtained a sample that looked like dried blood from a Michigan house. Examining this material, a University of Michigan lab found *pseudomonas fluorescens*, the same bug used on Oakville. It can cause horrible human infections including fatal shock, and because of its glowing properties, it allows the military to track its path.

In 1999, Jonathan Moreno of Clinton's Committee on Human Radiation Experiments, also confirmed in his book *Undue Risk* decades of military-intelligence experimentation on civilians without their knowledge or consent.

Vaccinia/Rabies Wildlife Bait Dropped From The Sky

<http://www.rense.com/general32/cvfv.htm>

## APPENDIX F

### STAND FOR NO SPRAY

**The Mission of The California Alliance to Stop the Spray (CASS) is to provide an organizational vehicle by which residents of the state protect their unalienable rights to safety and privacy, and to not have their persons or property, including public areas, sprayed with chemicals or any other substance.**

Therefore, C.A.S.S. would support a platform to ally organizations that reflects this mission.

So we would suggest the following:

(Protection of Rights and Safety)

C.A.S.S.:

Re-affirms individual sovereignty and unalienable rights to private property and safety as institutionalized in both the California and United States Constitutions, and

Reaffirms the California State Regulation and the Nuremberg Code that prohibit Medical Experiment on Humans without their Informed Consent and

Reaffirms as such:

- 1) Opposes the State and Federal program of aerial spraying for LBAM except on private agricultural lands as requested by the owner.**
- 2) Opposes the State and Federal program of pesticide treatment for LBAM on private property except as requested by the owner.**
- 3) Opposes exposure of the public to any substance that has the potential to cause health or environmental hazard, so the burden of proof of safety is with the initiating party, subject to truly independent review and including fair public representation.**

C.A.S.S.:

Re-affirms the Rio Declaration on Environment and Development which establishes the right to information about environmental toxics to which they may be exposed and to participate in the decision making process, and as such:

- 4) Demands full disclosure to the public of all ingredients in any pesticide formula to which they might be exposed.**

(Solutions)

C.A.S.S.:

- 5) Calls for a re-classification of LBAM as an established species and a termination of the “State of Emergency.”**
- 6) Supports healthy agricultural growing practices that are naturally resistant to pests and do not need to rely on a continuous cycle of pesticide use.**
- 7) Supports the type of healthy pest management “best practices” techniques used successfully in New Zealand, should LBAM ever get out of balance and become a problem. In addition to intercropping, these include enhancing natural predators, employing insect growth regulators and trapping.**

## **APPENDIX G**

### **NOTES ON SOLUTIONS (see p. 8)**

**(#1)**

Change the Pest Rating! An “A” pest rating requires quarantine and certain eradication efforts. In light of recent research, LBAM should be downgraded to a “C,” “Q” or “D.” which would eliminate the State of Emergency” and halt the spray.

#### **CDFA PLANT INDUSTRY GUIDELINES FOR ESTABLISHING OR CHANGING PEST RATINGS ACTION ORIENTED RATING SYSTEM**

##### **DEFINITIONS**

“A” – An organism of known economic importance subject to state (or commissioner when acting as a state agent) enforced action involving: eradication, quarantine regulation, containment, rejection, or other holding action.

“B” – An organism of known economic importance subject to: eradication, containment, control or other holding action at the discretion of the individual county agricultural commissioner.

or

An organism of known economic importance subject to state endorsed holding action and eradication only when found in a nursery.

“C” – An organism subject to no state enforced action outside of nurseries except to retard spread. At the discretion of the county agricultural commissioner.

or

An organism subject to no state enforced action except to provide for pest cleanliness in nurseries.

“Q” – An organism or disorder requiring temporary “A” action pending determination of a permanent rating. The organism is suspected to be of economic importance but its status is uncertain because of incomplete identification or inadequate information.

In the case of an established infestation, at the discretion of the Director, the Department may conduct surveys and may convene the Division Pest Study Team to determine a permanent rating.

“D: - No action (Parasites, predators, and organisms of little or no economic importance).

#### **IV, PROCEDURE FOR CHANGING ESTABLISHED RATINGS**

A. Any interested person may recommend a change in an established rating by submitting a request to the Assistant Director for Plant Industry. The Assistant Director will refer the request to the appropriate primary state professional.

B. To change an “A”, “B”, “C”, or D” rating, the proposer presents supporting documentation to the appropriate primary state professional, and they reach agreement on the proposed rating change.

**(# 10, 13 & 18)**

Q - Why should residents bother with legislative actions and law suits if the USDA, CDFA and the Governor are already in violation of so many existing laws?

A - It attracts media attention which leads to increased transparency, particularly through Freedom of Information Act (FOIA) and Subpoena, It gathers political support. It exposes unfair and unhealthy practices by politicians, government agencies and corporations which can begin to sway the public opinion upon which their power ultimately rests. And sometimes we get new and better laws which at least support law suits to help enforce fair treatment.

Q - If the government has the Doctrine of Sovereign Immunity, the Emergency Powers Act and the Supremacy Clause [http://members.tripod.com/C E A S E/sigler.html](http://members.tripod.com/C_E_A_S_E/sigler.html) at their disposal to *override any existing laws*, (so that you have to win two or three times in court to stop the spray) is there anything we can do that would actually stop the spraying?

A - Yes, the USDA has certain criteria, set forth in their Emergency Programs Manual (p.92) under which an emergency program can be terminated.

- 1) The emergency project successfully eradicates the target pest.
- 2) The target pest becomes established and available resources are insufficient for eradication.**
- 3) The target pest becomes established and a domestic quarantine is established.
- 4) Control measures (i.e., pest management, biological control) are found and an emergency project is no longer necessary.**
- 5) Sociopolitical opposition prevents emergency action.**
- 6) The plant pest is reclassified, so that it is no longer an actionable pest.**

Four of these six conditions (highlighted) appear to be viable causes for ending this aerial pesticide assault:

Regarding #2) Numerous experts are in agreement the moth is already established and ineradicable.

Regarding #4) Control measures, if needed have already been proven in New Zealand, Australia and Hawaii.

Regarding #5) The sociopolitical opposition is already vast, mounting and just beginning to reach into the other seven counties, beyond Monterey and Santa Cruz, which are slated for spraying.

Regarding #6) The LBAM can justifiably be downgraded in its classification and the so-called emergency goes away and the health dangers, economic impacts, expensive law suits and initiatives can disappear.

**(#11)**

**Government Enforcement of Agency Violations**

Creation of the Office of Environmental and Democracy Law Enforcement in the Attorney General's Office. This is needed to provide enforcement of these laws when a public agency, which is already defended by the AG's office, fails to follow important public laws.

This office will vigorously enforce California's Environment and Democracy protection laws and Constitutional rights with priority for our RIGHT TO SAFETY, PUBLIC RECORDS REQUESTS, OPEN MEETINGS, CEQA, COASTAL ACT, and PROTECTION FOR ENDANGERED SPECIES and their habitats, CLEAN WATER, CLEAN AIR, and CLEAN FOOD LAWS.

**(#21)**

**Adopt ordinances** banning corporate chemical and radioactive bodily trespass, refusing to recognize corporate constitutional "rights" and to prohibit corporate rights from being used to override the rights of human and natural communities.

(See Community Environmental Legal Defense Fund)

<http://www.celdf.org/Ordinances/tabid/61/Default.aspx>

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# Light Brown Apple Moth Quarantine Covers at Least 182 Square Miles in Five California Counties

April 20, 2007

*CDFA news release announcing the California quarantine  
and listing the areas affected.*

# News Release

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE



## Media Contacts:

Jay Van Rein, (916) 654-0462, [jvanrein@cdfa.ca.gov](mailto:jvanrein@cdfa.ca.gov)

Steve Lyle, Director of Public Affairs, (916) 654-0462, [slyle@cdfa.ca.gov](mailto:slyle@cdfa.ca.gov)

Arnold Schwarzenegger, Governor  
A. G. Kawamura, Secretary

## Light Brown Apple Moth Quarantine Covers at Least 182 Square Miles in Five California Counties



Release #07-040

[Print This Release](#)

*Recent detections in Monterey, Santa Cruz and San Mateo counties will add new areas for regulations*

SACRAMENTO, April 20, 2007 - The California Department of Food and Agriculture has established a quarantine of at least 182 square miles, including portions of Alameda, Contra Costa, San Francisco, Marin and Santa Clara counties, due to an infestation of light brown apple moth, an invasive species. The quarantine boundaries were developed in cooperation with the affected county agricultural commissioners and the United States Department of Agriculture. The quarantine is expected to expand soon due to recent detections of the pest in Monterey, Santa Cruz and San Mateo counties.

The quarantine regulations prohibit the movement of all nursery stock and all host fruits and vegetables and plant parts within or from the quarantine region unless it is certified as "free-from" the pest by an agricultural official; is purchased at a retail outlet; or was produced outside the area and is passing through in accordance with accepted safeguards. The quarantine applies to residential and community properties as well as commercial enterprises.

The areas under quarantine are as follows:

**Alameda/Contra Costa counties** - The northern boundary is San Pablo, the western boundary is San Francisco Bay, the southern boundary is the south end of Alameda, and the eastern boundary is Orinda. Communities within the quarantine region include: Oakland, Berkeley, Alameda, Emeryville, Kensington, Orinda, Albany, El Cerrito, Richmond, San Pablo and El Sobrante. Boundaries are also being developed for a recent detection in the Danville area, and will be announced as soon as possible.

**San Francisco** - The city north of the I-280/101 junction is under quarantine, as are sections to the southwest and southeast of that point.

**Marin County** - Four distinct sections of Marin County are under quarantine:

1. The Sausalito area's quarantine boundaries are generally from the Golden Gate Bridge northward to Rodeo Avenue, and from the bay westward to the boundary of the Golden Gate National Recreation Area (just west of Highway 1).
2. In Mill Valley, the southern boundary is along Richardson Bay, the northern boundary is Tamalpais Drive east of Hwy. 101, the western boundary is near the border of the Muir Woods National Monument, and the eastern boundary extends from Granada Park southward along Reed Ranch Road to the bay.
3. In San Rafael, the boundary extends from its western boundary along I-580 and Hwy. 101 to its northern

boundary along North San Pedro Road eastward to the bay, and southward along the water's edge back to I-580.

4. In Novato, the southern boundary is Indian Valley Road, the northern boundary is in the rural area north of San Marin Drive, the western boundary is Redwood Boulevard, and the eastern limit is just east of Stafford Lake.

Boundaries are also being developed for a recent detection in the Tiburon area, and will be announced as soon as possible.

**Santa Clara County** - In the Los Altos area, the southernmost point of the quarantine is the I-280/S. El Monte Road intersection, its western boundary runs up I-280, Junipero Serra Blvd. and Campus Drive, its northern boundary is between University and Embarcadero, and its eastern boundary is through the slough just east of the Bayshore Fwy (Hwy 101).

Boundaries for Monterey, Santa Cruz and San Mateo counties are being established and will be announced as soon as possible. Light brown apple moth detections in Monterey County were at Prunedale and Royal Oaks. The detections in Santa Cruz County were in Soquel. The detection in San Mateo County was at Belmont.

People who are unsure if they are within the quarantine zone are asked to assume that they are.

The first detection of light brown apple moth in the Bay Area came on February 27. Since then, more than 170 have been detected in the quarantine regions. Trapping and surveying will continue to add information about the parameters of the infestation. If detections occur in additional regions, the quarantine will be expanded.

Light brown apple moth is native to Australia and is found in New Zealand, Ireland, the United Kingdom and Hawaii. The range of host plants is broad, with more than 250 plant species known to be susceptible to attack by this pest. Major domestic hosts of concern include ornamental plants, oak trees, stone fruit (peaches, plums, nectarines, cherries and apricots), apples, pears, grapes and citrus.

The pest destroys, stunts or deforms young seedlings; spoils the appearance of ornamental plants; and injures deciduous fruit-tree crops, citrus and grapes.

The USDA and CDFA have assembled a technical working group comprised of international experts on light brown apple moth to discuss survey and mitigation strategies to safeguard against this potentially damaging pest and prevent its further spread. The two agencies will continue to work together to take the appropriate regulatory action to prevent the spread of this pest in association with the movement of host commodities.

For more information on light brown apple moth, visit [www.cdfa.ca.gov](http://www.cdfa.ca.gov) and [www.cdfa.ca.gov/phpps/pdep/lbam\\_main.htm](http://www.cdfa.ca.gov/phpps/pdep/lbam_main.htm).

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*The California Department of Food and Agriculture protects and promotes California's \$31.8 billion agricultural industry. California's farmers and ranchers produce a safe, secure supply of food, fiber and shelter; marketed fairly for all Californians; and produced with responsible environmental stewardship.*

California Department of Food and Agriculture Office of Public Affairs  
1220 N St., Ste. 214, Sacramento, CA 95814  
916-654-0462, [www.cdfa.ca.gov](http://www.cdfa.ca.gov)



# Plant Health: Light Brown Apple Moth

*USDA Animal Plant and Health Inspection Service's basic fact sheet about the LBAM species.*



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## Plant Health

### Light Brown Apple Moth

#### Background

The light brown apple moth (LBAM), *Epiphyas postvittana* (Tortricidae), is a native pest of Australia and is now widely distributed New Zealand, the United Kingdom, Ireland, and New Caledonia. Although it was reported in Hawaii in the late 1800s, a recent LBAM detection in California is the first on the United States mainland. USDA confirmed the detection of LBAM in Alameda County, California on March 22, 2007. The California Department of Food and Agriculture (CDFA) aggressively surveyed the area to discover the extent to the infestation and identified the pest in 11 additional counties. Intense control activities have contained LBAM within the initial detection area, and effectively eradicated the pest from Napa and Los Angeles counties.

LBAM is of particular concern because it can damage a wide range of crops and other plants including California's prized cypress as well as redwoods, oaks and many other varieties commonly found in California's urban and suburban landscaping, public parks and natural environment. The list of agricultural crops that could be damaged by this pest includes grapes, citrus, stone fruit (peaches, plums, nectarines, cherries, apricots) and many others. The complete "host list" contains well over 1,000 plant species and more than 250 fruits and vegetables.

USDA and CDFA are working aggressively to control and eradicate this pest before it has the chance to spread requiring greater resources to protect American agriculture and our urban and suburban landscape.

#### In the News

- Jan 24, 2008 [Conner Announces Nearly \\$75 Million in Additional Funding for Light Brown Apple Moth Eradication](#)
- Aug 10, 2007 [USDA Announces Additional Funds To Control Light Brown Apple Moth](#)

#### Biology

The adult insect is a moth about 10 mm long when resting with the wings folded in a characteristic bell shape. Coloring is variable but they are generally yellowish-brown with darker brown markings on the forewings. The females often have a dark spot on the hind margin of the forewing. Females can lay eggs between six and 10 days after moth emergence, depending on the temperature. Eggs are laid in masses on the upper surface of any smooth-leaved host plants. The eggs are flat, and with a pebbled surface and take from five to more than 30 days to hatch, depending on the temperature.

The newly hatched larvae (caterpillars) are very tiny, with a pale yellow-green body and a pale brown head. Early instar larvae wander actively over plant surfaces and may suspend themselves from a fine silken thread until they find a suitable feeding site. The young larvae prefer the underside of leaves and usually start to feed adjacent to a vein where they spin a protective cover of fine webbing. The pupa (chrysalis) is at first green, but soon becomes brown after rapidly hardening, and then dark

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- [View the PPQ Organization Structure](#)
- [Learn about the Center for Plant Health Science and Technology \(CPHST\)](#)
- [View the MOA between DHS and USDA](#)
- [View the Final Report and Action Plans of the APHIS-CBP Joint Task Force on Improved Agriculture Inspection](#)
- [View the PPQ Civil Rights Strategic Plan](#)

typically found in a thin-walled silken cocoon between two leaves webbed together, and is usually 10-15 mm long; the female pupae are larger than those of the male. Males and females can be distinguished by examining the pupa from the lower surface.

### Identification

There are many native tortricids that can be confused for the LBAM. Adult moths must be identified by a qualified entomologist. Larval stages cannot be reliably identified using morphological characters. If you suspect the presence of LBAM, please notify your state department of agriculture or the [State Plant Health Director's Office of USDA, APHIS, PPQ](#).

[California Department of Agriculture](#) (quarantine maps and other information for California)

- [CDFA Regulation](#)

[LBAM Economic Analysis](#) (PDF; 1.06 Mb)

[National Survey](#) (PDF; 916 Kb)

[Frequently Asked Questions](#) (PDF; 28 Kb)

[Situation Reports](#)

### Regulatory Communications and Information

- [Exempted Host List - Appendix I - \(8/07\)](#) (PDF; 22 Kb)
- [APHIS Regulatory Protocol - Appendix II \(10/07\)](#) (PDF; 14 Kb)
- Federal Orders - Interstate Movement Restrictions
  - [Federal Order \(4/28/08\)](#) (PDF; 28 Kb)
    - State of California - the counties of Santa Barbara and Sonoma
  - [Federal Order \(5/2/07\)](#) (PDF; 14 Kb)
    - State of California – the counties of Alameda, Contra Costa, Marin, Monterey, Santa Clara, Santa Cruz, San Francisco, and San Mateo
    - State of Hawaii – all counties
  - [Federal Order \(9/17/07\)](#) (PDF; 38 Kb)
    - State of California – the counties of Alameda, Contra Costa, Marin, Monterey, Santa Clara, Santa Cruz, San Francisco, Los Angeles, Napa, Solano, and San Mateo
    - State of Hawaii – all counties
  - [Federal Order \(11/20/07\)](#) (PDF; 28 Kb)
    - State of California – the counties of Alameda, Contra Costa, Marin, Monterey, San Francisco, San Mateo, Santa Clara, Santa Cruz, and Solano
    - State of Hawaii – all counties
- SPRO Letters
  - [Alameda and Contra Costa Counties, California \(3/22/07\)](#) (PDF 37 Kb)
- [NAPPO Phytosanitary Alert](#)
- [Mini Risk Assessment - Light brown apple moth, \*Epiphyas postvittana\*](#) (PDF; 9Mb)
- [Environmental Documents](#)
- EPA-approved Pheromone Labels
  - [CheckMate OLR-F](#) (PDF; 250 Kb)
  - [CheckMate LBAM](#) (PDF; 47 Kb)

### Technical Working Group

- [TWG comments regarding report entitled, "Integrated Pest Management Practices for the Light Brown Apple Moth in New Zealand: Implications for California"](#) (3/08) (PDF; 43 Kb)
- [TWG Recommendations, December 2007 meeting in San Diego, California \(1/25/08\)](#) (PDF; 37 Kb)
- [TWG Recommendations, May 2007 meeting in San Jose, California \(6/8/07\)](#) (PDF; 41 Kb)

#### Australian Government

- [Light Brown Apple Moth](#)
- [Light Brown Apple Moth in Citrus](#)
- [Light Brown Apple Moth in Orchards](#)

#### Canadian Government

- [Canadian Quarantine Map](#) (PDF; 516 Kb)
- [Canadian Food Inspection Agency Light Brown Apple Moth web site](#)

#### Images

- [Image Gallery](#)
- [Tortricid.net](#)
- [Crop Damage](#) (PDF; 470 Kb)

#### HortNet - [Light Brown Apple Moth](#)

UC Statewide Integrated Pest Management Program - [Light Brown Apple Moth in California: Quarantine, Management, and Potential Impacts](#) (PDF; 801 Kb)

UC California Agriculture Journal - [Light Brown Apple Moth's Arrival in California Worries Commodity Groups](#)

#### **LBAM Identification Aids**

- [LBAM Screening and Identification Guide](#) (PDF; 26 Kb )
- [Insect Removal Method from Sticky Traps](#) (PDF; 201 Kb)

Last Modified: May 16, 2008

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# Light Brown Apple Moth: Implications for California Agriculture

April 1, 2008

*Summary report contrasting the alleged impact of the LBAM on agriculture with the impact indicated by existing scientific evidence.*

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# Light Brown Apple Moth (LBAM)

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## Implications for California Agriculture

### Summary Report Prepared by

Teresa Aquino  
Blue Bamboo  
Santa Cruz, CA

Daniel Harder PhD  
Department of Evolutionary Biology  
University of California  
Santa Cruz, CA

Kenneth Kimes  
Greensward Nurseries  
Aptos, CA

Jeff Rosendale  
Horticulture Consultant  
Watsonville, CA



# LBAM: Implications for California Agriculture

## Introduction

There has been a significant amount of misinformation regarding the impact of LBAM on California agriculture. Regarding LBAM there are two primary agricultural concerns: 1. The potential loss of revenues due to crop damage should LBAM go unchecked. 2. The loss of agricultural revenues due to domestic and international quarantine restrictions against LBAM.

## Methodology and Contacts

The opinions expressed in this document were developed from a review of the primary scientific literature regarding the biology of LBAM, agricultural journals from Australia and New Zealand, field excursions to New Zealand growing regions, interviews with experts in horticulture, pheromones, biological controls, integrated pest management, communications with agricultural officials worldwide, specific LBAM experts, and a critical review of the CDFA's and USDA's published documents.

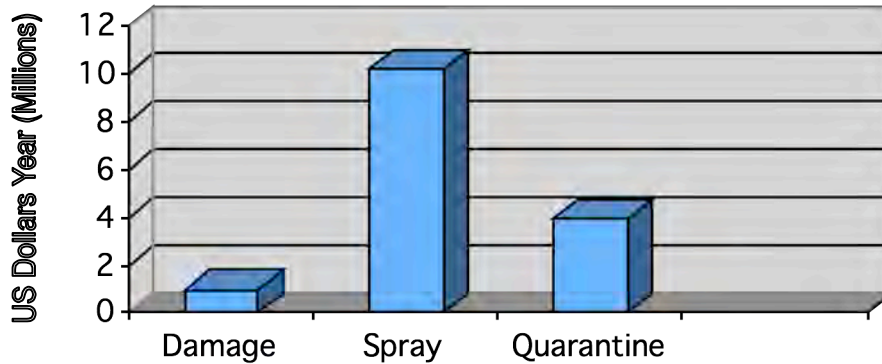
## History of Classification of LBAM As an Objectionable Pest

According to agriculture sources in New Zealand, LBAM was classified as a objectionable pest by the US in the 1980s along with approximately 29 other native pests from Oceania. Any individual or commercial interest has the ability to recommend a classification or reclassification of a pest through USDA. Typically, documentation of any recommendation to restrict a pest must be submitted as a matter of public record. Data regarding the justification for creating a restrictive classification for LBAM has not been found through on line searches of the National Agricultural Library, formal requests and searches by National Agricultural Library librarians, reviewing the published agricultural literature, or through searches and inquiries through State assembly representatives. Thus, there appears to be no documentation justifying the original classification of LBAM as an objectionable and therefore quarantinable pest.

## Trade Implications of LBAM As an Objectionable Pest

Classifying LBAM and other non-native pests as objectionable likely awarded the US a trade advantage in citrus and apples at a time when Australia and New Zealand were developing as apple and citrus producers. To maintain access to US markets, both Australia and New Zealand have to meet US LBAM restrictions. Today, neither Australia nor New Zealand have difficulties meeting the US zero tolerance against LBAM through the use of integrated pest management practices. According to the USDA, the highest percentage of costs associated with LBAM in Australia is due to those incurred to meet US restrictions, not from crop damage. This is illustrated in Figure 1. The costs associated with the spray are to maintain LBAM populations to a non-detectable level, not because of the potential for crop damage but to meet US zero-tolerance requirements. Additionally, in New Zealand, LBAM is not singled out but is rather collectively grouped with other leafrollers into a leafroller complex, with leafroller-associated costs similarly attributed to the need to meet US standards. Thus, costs associated with damage of crops is an accumulation of costs due to the leafroller complex not of LBAM alone. In Hawaii, where LBAM has been an introduced insect for more than 100 years, no damage to crops has been published that could be found.

**Figure 1 Grower Costs for Management of LBAM in Australia**



Source: United States Department of Agriculture, Oct 16, 2007

New Zealand Agriculture experts also report very little crop damage due to LBAM and very little need to treat for LBAM, except to meet US requirements. Rather, in most cases, control measures used for management of other pests (e.g. woolly apple aphid, mealy bugs, scale, thrips, mites, and especially codling moth), provides almost complete control over LBAM making the necessity to treat LBAM specifically very rare. By exempting various crops from quarantines, CDFA has acknowledged that treatment of other pests that will also affect LBAM is a legitimate control measure for LBAM.

Similarly, LBAM restrictions in both Canada and Mexico are harmonized with the US in order to meet the zero-tolerance required to maintain access to US markets, not necessarily because either country believes LBAM represents a significant danger to crops.

Because LBAM was identified in the US, this invoked the quarantine restrictions of Canada and Mexico. Thus, the original US-initiated quarantine policies against LBAM that may have originally protected US agricultural interests have now been invoked against US agricultural interests leading to this current "emergency".

### **Biology of LBAM: Not a Pest of Economic Significance**

LBAM is classified as a superficial leafroller. LBAM does not survive freezes, does not reproduce well at temperatures below 45 °F, and cannot thrive above 87 °F (USDA 2008; Venette et al. 2003) making it highly unlikely to occupy or thrive in much of California or US growing regions. This is evident in Hawaii where LBAM populations are limited to higher cool and moist elevations. Like many other leafrollers, the agricultural damage associated with this class of pests is minimal and largely cosmetic. Experience has shown these insects predominantly cause superficial nibbling, occasionally blemished fruits, and rarely any damage of economic significance. California has more than 300 known LBAM-related tortricids, most of which do not cause any demonstrable damage to agricultural crops or native flora and most of which are controlled either by natural predators, of which there are many, or by general control methods for other pests, as noted previously. Agriculture experience in Australia, Hawaii, and New Zealand support these findings. In New Zealand, in the absence of organophosphates, beneficial predators provide a high degree of control of the leafroller complex and, in New Zealand, occasional use of insect growth regulators (e.g. Intrepid, Confirm: methoxyfenozide, tebufenozide) may be employed if monitoring data warrants it. Monitoring for LBAM is predominantly done to meet US zero-tolerance requirements and when necessary (also in order to meet US trade requirements) a single treatment of insect growth regulators applied in the springtime at the time of pupae development provides adequate control for the year. In the range of pests of potential economic

significance, the leafroller complex is a relatively low priority and is rarely a problem, with 99% of economic damage to crops due to other pests.

From a biological perspective, LBAM is a generalist and does not bloom out to infest any single crop. As a generalist, all stages of the life cycle of LBAM are parasitized by general predatory factors that include ants, bacteria, bats, beetles, birds, earwigs, spiders, minute stingerless wasps, and viruses. California and all parts of the US are replete with these general predators and California specifically has native wasps that alone offer a high degree of parasitization, as demonstrated in pilot studies by USDA and by researchers in the University of California system. Primary LBAM literature suggest rates of parasitization as high as 99% with a survival rate of only 1% from egg to pupae (Geier and Briese 1980). Other LBAM literature shows that tortricids, in general, show a level of egg parasitism of up to 30%; larval parasitism up to 60%; and pupal parasitism to 70% (Van Der Geest and Evenhuis 1991). These findings may be significantly compelling and suggestive of even higher levels of parasitism since these findings were at a time when organophosphates were widely used, which would have had a significantly detrimental effect on LBAM predators. It has been demonstrated that the discontinuation of organophosphates results in greater degrees of LBAM parasitism due to beneficial predators (Geier and Briese 1980).

As noted, the most practical consideration for those in agriculture is the fact that pesticide treatments that are applied for the management and control of other pests (e.g. wooly apple aphid, mealy bugs, scale, thrips, mites, and especially codling moth) also provide control over the leafroller complex making treatment of LBAM specifically a practice of the past, except in rare instances. Additional integrated pest management practices such as regular mowing in the summer, removal of green waste that can harbor eggs in understories during the winter, intercropping, and leaving flowering weeds (clover, coriander, borage) to draw beneficials have all been shown to provide natural controls against leafrollers in general and LBAM specifically (Begum 2004; Begum et al. 2006; Irvin et al. 2000; Thomas and Burnip 1993).

## Rethinking “Eradication”

With today's global trade and travel it is not practical for the US to implement eradication programs for every non-native species that enters the US. The basic biology of the pest and its realistic impact on agriculture and our environment should be determined PRIOR to the implementation of any action. This is especially true when a central part of the treatment program includes long-term spraying of residential areas and the use of organophosphates and other pesticides (e.g. chlorpyrifos, Bt, permethrin, spinosad) in residential communities that are otherwise only approved for limited and highly controlled use in agricultural areas. The applications of these in the broader ecosystem can lead to disruption of the ratio of pests to beneficial predators, in favor of the pests, therefore making it more difficult to control pests long-term. All indications suggest that LBAM is a pest that should have been subject to appropriate monitoring prior to moving into eradication.

There is a need to rethink overall pest management policies with a focus on control versus eradication. Eradication implies an emergency program is needed and invokes numerous national and international quarantines that puts a tremendous burden on the farming community, or in this case, exposes residential communities, children, schools, community parks and playgrounds to pesticides usually reserved for specific agricultural use. Under current policies, a declared “emergency” means the government carries the financial burden of managing the emergency program, whereas with “controls”, the financial burden is carried by industry. This is another policy that requires consideration as there are times when Government funds would be best spent on control rather than eradication programs. This is likely the case with LBAM. As noted, all indications from agriculture experts in Australia, Hawaii, and New Zealand suggest LBAM is not a pest of significant economic impact with regards to actual crop damage. However, it appears that US policies demand an action before negotiating with trading partners to change restrictions. In light of LBAM experiences in other countries where LBAM is naturalized, the most legitimately necessary action would be effective monitoring of potential movement of LBAM from its current locale into agricultural areas and then monitoring to determine if it in fact represents a pest requiring treatment. In New Zealand in 2006, exporters shipped approximately 3000 containers of produce to the US. Of these 3000, only 7 were restricted due to LBAM finds. These

were shipped to markets without LBAM restrictions. Based on current agriculture experience and in the context of modern agriculture practices, natural biological controls and controls used for other pests typically provide adequate agricultural controls for LBAM needed to meet US and international quarantine restrictions. Occasional, specific controls (e.g. insect growth regulators) for the leafroller complex in general are used, whereas pheromones are only used for monitoring and population suppression but not for eradication.

In practice, it appears that CDFA has never successfully eradicated a species. According to standard integrated pest management texts (Flint and Gouveia 2001; Norris et al. 2003) eradication is defined as "complete elimination of a species from a particular area." Since 1982, CDFA has implemented 274 eradication programs against 12 species of pests, not including for LBAM. Eradication programs for every one of these pests have continued until 2006 (see Table 1). Thus, in reality, these programs are long term pest management programs, that, for funding purposes, are defined as eradication programs, thus giving USDA/CDFA access to emergency funds to which they may otherwise not have access. It is the "emergency" status of the program that justifies the implementation of pest eradication programs in residential areas, the obviation of the environmental impact reviews, and the risk of subjecting residential areas to exposure to pesticides that would normally be restricted to agriculture use. If emergency funds were available for control rather than eradication programs, such funds could have been used for effective monitoring to determine if eradication was in fact needed, before moving into an emergency-eradication program. Thus, consideration should be given to modifying national agriculture policies in such a way that would allow emergency funds to be allocated for appropriate monitoring and control measures, not just emergency eradication programs that put a tremendous burden on the farming community and expose residential areas to perhaps unnecessary application of agricultural pesticides.

## LBAM Invasion Biology

The USDA and the CDFA believe that because the LBAM only occupies limited areas in California that it is possible to eradicate it. This opinion is not widely shared by entomology experts who believe that the populations of LBAM identified to date, which likely represent only a fraction of the diverse populations in California, are too widespread for eradication to be successful. LBAM was first identified in California in July 2006 by retired entomologist Jerry Powell who caught the first confirmed specimen of LBAM in his backyard insect traps in Berkeley. According to Powell:

*"Because it's a general feeder -- it's polyphagous -- it doesn't seem to me there's much point in quarantining things, especially after they've found it all around."*

USDA entomologist John Brown echoed a similar opinion:

*"By the time Jerry collected this thing in his backyard, clearly it had been established in the Bay Area for a long time..."*

While it is normal to have dissenting opinions among scientific experts it appears that only those experts utilized by USDA in the development of the eradication program and those employed by CDFA to implement this program believe eradication can be accomplished. Rather than simply pitting one scientific opinion against another it is important to look at the basic principles of pest invasion biology to determine the predictability of eradication of a species to succeed.

Principles for successful eradication are outlined in the scientific literature and consist of three primary phases: (1) the attack phase, during which the organism to be eradicated is attacked with selected control measures in order to interrupt transmission; (2) the consolidation phase, during which residual or imported cases are sought and eliminated; and (3) the maintenance phase, during which careful surveillance maintains the eradication is achieved (Yekutieli 1981). In the world of pest eradication this would equate to population reduction,

prevention of reintroductions at ports of entry, control of transport through transport channels (monitoring at state borders of entry), and continued and effective monitoring. These principles were emphasized by the USDA's LBAM Technical Working Group. Agriculture experts in New Zealand, further identified the agricultural conditions that need to be met in order for eradication to be achieved:

1. Extensive, even, and complete coverage of the pheromone.
2. Uniform blocks of a single crop.
3. Uniform topography (no canopies, slopes, hills or valleys).
4. Low population density of target pest (not too concentrated).

These critical conditions have not been met with regards to the current LBAM eradication program. Pheromones cannot be effectively used across large diverse areas with varying canopy heights, mixed species composition, and varying terrain areas, indicative of the Monterey-Santa Cruz-San Francisco areas. This inability for eradication of LBAM to be successful has been noted by Professor of entomology, Dr. James Carey, University of California, Davis, in testimony to the California District Court (2007) who stated that eradication of LBAM in California was "virtually impossible" further stating:

*"...even under optimum circumstances, eradication of a species is an enormous challenge. Optimum factors in pest eradication include small, well-delineated populations; effective eradication tools; highly effective monitoring techniques; support of multi-year programs."*

In California the populations of LBAM are not well delineated, pheromones have never been used to eradicate a species, no pesticide, pheromone or organophosphate, is ever 100% effective at controlling or killing a species, insects are known to specifically develop resistance against pesticides making them more difficult to control, LBAM has been shown to become resistant to organophosphates (Suckling et al. 1984; Thomas 1987) and other leafrollers have been shown to become resistant to pheromones (Tabata 2006). Therefore, for these and the other reasons presented, the belief that LBAM can be eradicated is not supported by the overwhelming majority of scientific literature, expert opinion, and agricultural experience. The choice to initiate an eradication program is not based in science but politic and emergency funding.

## **Solution: Reclassification of LBAM**

In light of the reviews of the biology of LBAM along with clear indications that it is not a pest of significant economic consequence to agriculture or native flora, the simplest solution to the problem of LBAM is for the USDA to reclassify LBAM to a pest not requiring quarantine thus harmonizing with most international markets such as the European Union and United Kingdom and maintain monitoring programs to ensure. Most other countries only consider LBAM a quarantine pest based on the need to meet the zero-tolerance of the US. Some exceptions, such as Japan also maintain quarantine restrictions against LBAM. It is unknown whether Japan restrictions are due to US trade policies, concerns for LBAM specifically, or a true concern over leafrollers, which can uniquely have an impact on tea plantations.

## **Negotiations with Trade Partners**

Soon after the identification of LBAM in California, agricultural trading partners such as Mexico issued Phytosanitary Advisories against agricultural products in select counties where LBAM was located. Trading partners did not mandate for an eradication program to be implemented. Rather they require assurance that US exports be free of LBAM. The same basic quarantines apply with regards to

domestic commerce of California produce. However, numerous crops including brassica species (broccoli, brussel sprouts, cabbage, etc.), parsley, collards, celery, head and leaf lettuce, spinach, asparagus, carrots, peppers, artichokes, and walnuts, among others, were exempted from interstate quarantines and Mexico recently relaxed export requirements for certain items showing flexibility in the enforcement of quarantine restrictions. The key denominators in obtaining these exemptions is that the crops are either subject to integrated pest management practices which will sufficiently reduce the risk of spread of LBAM, that other management tools that will target Lepidopteran species in general are being used, or that the host portion of the crops are not present (leaves absent or removed; e.g. root crops).

In addition to the flexibility that can be exercised in meeting the phytosanitary restrictions, agriculture officials in Mexico expressed a willingness to remove LBAM restrictions should the US change its own quarantine policies with regards to LBAM or in the presence of new technical and scientific information regarding LBAM (see Figure 2). A review of LBAM within the context of modern agriculture practices provides such information. Communications with Canadian agriculture officials have implied a similar willingness to modify policies in light of changes in US trade restrictions. Thus, it is contingent upon USDA to take the steps needed to declassify LBAM as an objectionable pest and address the broader international trade issues rapidly. For CDFA and California agriculture interests, reclassification of LBAM and discussions with trading partners would end the "Emergency", end the quarantine, and be the most cost-effective way to address the issue of LBAM quarantines. It appears that LBAM does not constitute the declared emergency. Therefore all aspects of this eradication program from the very justification of LBAM as an objectionable pest to the emergency declaration for the implementation of the program should be reconsidered, beginning with a downgrading of the classification of LBAM as an objectionable pest. Additionally, national funding policies should be modified to allow for State or Federal funding to agriculture interests for increased monitoring and control of pests in general so that the most appropriate manner of support can be given to the agricultural industry without having to resort to emergency programs.

**Figure 2 Excerpt of Phytosanitary Advisory: Mexico**



STATE OF CALIFORNIA  
DEPARTMENT OF FOOD AND  
AGRICULTURE  
1220 N Street, Room A-372  
Sacramento, CA 95814

## PHYTOSANITARY ADVISORY

No. 12-2007

DATE: May 14, 2007  
TO: All County Agricultural Commissioners  
FILE: Export File  
SUBJECT: New Restrictions on the Shipment of Hosts of Light Brown Apple Moth to Mexico

Unnecessary to say that, the present phytosanitary conditions may be modified or harmonized whenever we have more technical and scientific information regarding *E. postvittana*, as well as we receive more information about the evolution status of this pest in the United States.

Finally, please be informed that the aforementioned restrictions will be into effect as of May 10, 2007.

Without further, please receive a cordial greeting.

Yours truly,  
The Chief Director

MVZ. ENRIQUE SANCHEZ CRUZ

Table 2 Eradication Programs of CDFA Since 1982

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE PEST DETECTION / EMERGENCY PROJECTS					
ERADICATION PROJECTS					
YEAR	EXOTIC PEST	NUMBER OF PROJECTS	YEAR	EXOTIC PEST	NUMBER OF PROJECTS
1980	GYPSY MOTH	1	1984	GUAVA FRUIT FLY	1
	ORIENTAL FRUIT FLY	1		MEDITERRANEAN FRUIT FLY	4
1983	GYPSY MOTH	2		ORIENTAL FRUIT FLY	1
	ORIENTAL FRUIT FLY	2	1985	MEDITERRANEAN FRUIT FLY	Total of 24
1983-84	MEXICAN FRUIT FLY	1		MEXICAN FRUIT FLY	2
	JAPANESE BEETLE	1		ORIENTAL FRUIT FLY	3
1984	GYPSY MOTH	5	1988	GYPSY MOTH	2
	CARIBBEAN FRUIT FLY	1		ORIENTAL FRUIT FLY	2
	ORIENTAL FRUIT FLY	4	1987	GUAVA FRUIT FLY	1
	PEACH FRUIT FLY	1		GYPSY MOTH	1
1985	GYPSY MOTH	2		MEDITERRANEAN FRUIT FLY	1
	ORIENTAL FRUIT FLY	10		MEXICAN FRUIT FLY	1
1988	ORIENTAL FRUIT FLY	8		ORIENTAL FRUIT FLY	9
	GUAVA FRUIT FLY	1		PEACH FRUIT FLY	1
1987	ORIENTAL FRUIT FLY	2	1985	MEDITERRANEAN FRUIT FLY	4
	GYPSY MOTH	1		MEXICAN FRUIT FLY	1
	PEACH FRUIT FLY	1	1986	ORIENTAL FRUIT FLY	3
	MEDITERRANEAN FRUIT FLY	2		MELON FRUIT FLY	1
	MELON FLY	1		GUAVA FRUIT FLY	1
1988	ORIENTAL FRUIT FLY	3		MEXICAN FRUIT FLY	2
	MEDITERRANEAN FRUIT FLY	2		ORIENTAL FRUIT FLY	2
1989	MEDITERRANEAN FRUIT FLY	15	2000	GUAVA FRUIT FLY	1
	ORIENTAL FRUIT FLY	12		ORIENTAL FRUIT FLY	4
1990	PEACH FRUIT FLY	1		GYPSY MOTH	2
	MEDITERRANEAN FRUIT FLY	13		GUAVA FRUIT FLY	5
	MEXICAN FRUIT FLY	2		MEDITERRANEAN FRUIT FLY	1
	GYPSY MOTH	2		MEXICAN FRUIT FLY	1
	ORIENTAL FRUIT FLY	4		ORIENTAL FRUIT FLY	6
1991	MEDITERRANEAN FRUIT FLY	1		JAPANESE BEETLE	1
	ORIENTAL FRUIT FLY	3	2001	GUAVA FRUIT FLY	1
	MEXICAN FRUIT FLY	1		MEXICAN FRUIT FLY	3
1992	MEDITERRANEAN FRUIT FLY	3		ORIENTAL FRUIT FLY	4
	ORIENTAL FRUIT FLY	2	2004	ORIENTAL FRUIT FLY	3
1993	ORIENTAL FRUIT FLY	8	2005	ASIAN GYPSY MOTH	1
	PEACH FRUIT FLY	1		ASIAN LONGHORNED BEETLE	1
	MEXICAN FRUIT FLY	2		GUAVA FRUIT FLY	4
	MEDITERRANEAN FRUIT FLY	8		MEDITERRANEAN FRUIT FLY	4
	GUAVA FRUIT FLY	1	2006	GUAVA FRUIT FLY	1
				ORIENTAL FRUIT FLY	11
				MEXICAN FRUIT FLY	1
				PEACH FRUIT FLY	1
				JAPANESE BEETLE	1
				DIAPRETES ROOT WEEVIL	1
			2007	GUAVA FRUIT FLY	1
				JAPANESE BEETLE	1
				MEDITERRANEAN FRUIT FLY	3
				MEXICAN FRUIT FLY	2
				ORIENTAL FRUIT FLY	3
				TOTAL NUMBER OF PROJECTS	274

LAST UPDATED: 06/2008  
 PATH: \\CDFA\DATA\CDFA\CDFA\OFFICE\CDFA\_PROJECTS\06\_08

274 "eradication" programs implemented by the State of California are against 9 pests beginning in 1982. All of these pests except that for the Asian gypsy moth eradication program, which was begun in 2005, were still being "eradicated" in 2000-2007.

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# America's Largest Private Companies - #312 Roll International

November 8, 2007

*Forbes's report on Roll International, including identification  
of its subsidiaries.*

# Private Company Services. Business is personal.\*

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## #312 Roll International

11.08.07, 6:00 PM ET

Roll International ranked #258 in 2006.

Industry: Conglomerates (agribusiness, floral delivery service)

11444 West Olympic Boulevard
Los Angeles CA 90064
Phone: 310-966-5700
Fax: 310-966-5758

CEO: Stewart Resnick ,

CFO: Robert Baxter

Table with 4 columns: 2006 REVENUES (\$1.43 bil), REVENUE CHANGE % (-3.3), EMPLOYEES (2,596), FISCAL YEAR END (Dec)

Based in Los Angeles, Roll International owns Teleflora (flowers-by-wire), Fiji Water, Paramount Agribusiness (nuts, citrus fruits), Pom Wonderful (fresh pomegranates and juice), and Suterra (pest-control products).

< Previous: KAR Holdings

Next: Apex Oil >

Rank | Company | State | Industry | Revenue | Employees

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Revenues exclude excise taxes where applicable, public subsidiaries and sales from discontinued operations. Revenues are worldwide figures.

- Forbes estimate.
1 Pro forma figure.
2 Company provided estimate.
3 Announced plans to go public.
4 Agreed to be acquired.
NA: Not applicable.

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# Pesticide Maker Owned by Political Donor

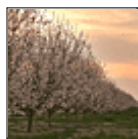
March 8, 2008

*SF Chronicle article outlining the political and monetary links  
in the LBAM realm.*

## Pesticide maker owned by political donor

Matthew Yi, Chronicle Sacramento Bureau

Saturday, March 8, 2008



**(03-08) 04:00 PDT Sacramento --**

The company that makes one of the pesticides state officials are considering spraying over the Bay Area to fight the light brown apple moth is owned by a wealthy California agribusinessman who has been a generous contributor to Gov. Arnold Schwarzenegger and other state officials.

According to federal and state agriculture departments, the moth's larvae could threaten more than 200 crops in California and could potentially put a significant dent in the state's \$32 billion agriculture industry.

Among the business owners whose agricultural operations in California could be affected by the insect is Stewart Resnick of Los Angeles, who owns nut and citrus tracts in the Central Valley.

His Roll International Corp. owns Paramount Farms, the world's largest grower of almonds and pistachios, and Paramount Citrus, one of the biggest citrus fruit producers in the United States.

Roll International's holdings also include Suterra LLC, a fledgling pesticide company in Bend, Ore., that makes CheckMate, a pheromone pesticide that is one of four chemicals being considered for aerial spraying by officials at the U.S. Department of Agriculture and the California Department of Food and Agriculture.

The chemical was sprayed over Santa Cruz and Monterey counties in the fall in an attempt to disrupt the moth's mating.

Resnick has been a longtime donor to politicians, giving hundreds of thousands of dollars to the Democratic Party and its candidates for state and federal offices. In recent years, he's also given nearly \$150,000 to Schwarzenegger's campaign, records show.

Although the governor supports the aerial spraying, that decision has no bearing on Resnick's political donations, said Aaron McLear, a Schwarzenegger spokesman.

"The governor leads by what he believes is in the best interest of California and doesn't take those types of things into consideration," the spokesman said.

Rob Six, a spokesman for Roll International, said "there's no quid pro quo" and added that Resnick and his wife and business partner, Lynda Resnick, generally make a lot of political contributions. Six agreed that

the moth could have an adverse impact on Roll International's farming business.

While the extent of damage the moth's larvae could cause is under debate, the pest is already affecting California growers' ability to export because other countries have begun placing restrictions on fruits, vegetables and nuts that are grown in areas affected by the moth.

"This is a very bad threat for a lot of growers," Six said. "And one of the biggest threats is on quarantines on our exports. ... There are many countries that have a blacklist for fruit or nut products if apple moth is found on them."

The nine Bay Area counties have been placed on the quarantine list by the U.S. Department of Agriculture, which is recognized by many nations that import California's produce.

Mexico last week added Los Angeles, Santa Barbara and Napa counties to that list, said Rayne Thompson, director of national affairs for the California Farm Bureau. Federal officials need to contain and eradicate the pest before it becomes widespread in the Central Valley, the heart of California's agricultural industry, she said.

"Other countries recognize the apple moth as a huge problem," Thompson said, adding that California exports about \$9 billion worth of produce each year. Restrictions could range from more stringent testing for the pest, which would cost more, to not importing the products, she said.

But debate continues to rage over how destructive the pest's larvae are and whether aerial spraying would work.

Larry Hawkins, a spokesman for the federal agricultural agency, said that there is no guarantee CheckMate would be chosen and that his department could also later change its decision about aerial spraying. The Environmental Protection Agency must give its approval, followed by a program to inform the public, he said.

But many people are concerned about the health effects of the pesticide. Last fall, hundreds of residents in Monterey and Santa Cruz counties complained of health symptoms including shortness of breath, muscle aches and sore throats after an aerial spraying of pheromone pesticides.

State officials have said they are examining the complaints but have not found evidence that the chemical is harmful.

Momentum to stop the spraying has been building in recent weeks, with thousands of Bay Area residents signing petitions to stop the spraying. Lawmakers have introduced five bills to control aerial application over urban areas, and four city councils in the region have voted to oppose the spraying.

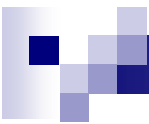
*E-mail Matthew Yi at [myi@sfgate.com](mailto:myi@sfgate.com).*

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# The Light Brown Apple Moth Aerial Spray Campaign: The Health Hazards of Particles, Toxins, Inflammatory Cascades and Genomic Predisposition

May 15, 2008

*Reference paper outlining the health concerns that are yet to be addressed.*

*Dr. Ann M. Haiden is an internist in private practice with a special interest in environmental, behavioral and nutritional impacts on health.*

## **The Light Brown Apple Moth Aerial Spray Campaign: The Health Hazards of Particles, Toxins, Inflammatory Cascades and Genomic Predisposition**

Ann M. Haiden, D.O.

May 15, 2008

There are health safety concerns about the use of aerosolized Checkmate LBAM-F spray as a mechanism to address the Light Brown Apple Moth in the San Francisco Bay Area that have not been addressed or investigated.

The ingredients in the proposed Checkmate LBAM-F spray and the spray capsules are a health concern. Neither has been tested in humans. Some of the ingredients, individually, are known to be toxic to humans or animals.

Butylated hydroxytoluene (BHT) and 2-hydroxy-4-n-octylbenzophenone are of particular concern. BHT is used in animal studies to induce lung damage and cancer in areas of the respiratory system that are reachable by the planned spray. BHT is activated into a more potent toxin and then cleared by the major detoxification enzymes cytochrome P450 and glutathione-S-transferase, which are variable in the population.<sup>2</sup> The effects of inhaled BHT in humans have not been studied. The benzophenone in the spray has not been tested but other benzophenones have been found to be stronger endocrine disruptors than bisphenol-A, a very concerning chemical.

The capsule particle size and how it interacts in the human respiratory system is a known health hazard.<sup>3,4</sup> The urea particles in the spray can be expected to reach areas of the lung that can cause damage. Further, the particles and the chemicals they carry can cause damage in the nasal passages and more proximal respiratory tract.

There is a general lack of information about the other ingredients in the spray and any characteristics that may exist when the ingredients are combined<sup>1</sup>, making it difficult to make informed decisions about their safety. What we do know is concerning because of the emerging knowledge about how potential chemical toxins interface with individual human biochemistry.

Toxins and noxious particles can set off complex cascades of regulators and inflammation that lead to disease and even cancer. Individual capacity to detoxify toxins varies, making some of the population more vulnerable to harm. When looked at from this 21st century perspective, the spray can conceivably be expected to cause a wide variety of health problems, ranging from increased cardiorespiratory illness to hormone related illness such as breast, reproductive and thyroid illness and even cancers.

## Overview

The Checkmate LBAM-F spray is reported to contain the following ingredients: water, (E)-11tetradecen-1-yl acetate (pheromone), (E,E)-9,11 tetradecadien-1-yl acetate (pheromone), ammonium phosphate, 1,2-benzisothiazol-3-one, 2-hydroxy-4-n-octylbenzophenone, cross linked polyurea polymer, butylated hydroxytoluene (BHT), polyvinyl alcohol, tricaprylyl methyl ammonium chloride and sodium phosphate.

The pheromone component is synthetically derived. In this discussion, it will not be differentiated from inert ingredients in keeping with the scientific evidence that both inert and active ingredients can have biologic effects.<sup>1</sup>

Particulate matter is a known health risk. Studies have shown increased mortality from exposure to particulate air pollution from cardiovascular and respiratory disease.<sup>4</sup>

There is the issue of the chemical constituents, alone and in combination, of the proposed spray and their known behavior in biologic systems. There is the lack of study in humans of those constituents, particularly via the proposed aerosolized polymer capsule delivery method. And, there is concern, derived from the accumulating evidence, that individual genetic variation and epigenetics are intricately related to how substances are processed by humans, and vary from person to person.

Thus, while the average of a population may not be adversely affected by an environmental chemical or particulate insult at all, or only at higher doses, individuals with less tolerant genetic predispositions may be more easily affected. Furthermore, since these predispositions are normal variations, they can affect significant percentages of a population. Therefore, this phenomenon should be taken into consideration when making decisions about any substance that will be applied, as the aerial spray program will be. Individuals who are already known to be at increased risk include infants and children, the elderly, and those with respiratory, cardiovascular or cardiopulmonary conditions and people with pre-existing environmental illness.

Lastly, any decision that is made must take into consideration future effects of the spray. We now know that exposure to substances of many types can have effects that become apparent only at a future time, such as hormone disruption, developmental defects, lung disease or cancer. Reliance on short-term symptoms, or lack thereof, as the major determinants of safety is misguided given our current, and growing, knowledge base.

## Genetics, Detoxification and Biotransformation

Progress in the understanding of the inter-relationship between environmental exposures and illness manifestations is in its fledgling stages. Nonetheless, much has been discovered and patterns are becoming apparent.

We now know that each person carries within them a collection of genetic polymorphisms, or variations, that code for a wide variety of biochemical enzymes and proteins. Genetic susceptibility appears to be greater at low dose.<sup>2</sup> Furthermore, there is an interconnected web of hormonal and inflammatory feedback mechanisms, with complex systems of receptors, transporters and kinases at play in health and disease. In addition, we have learned that genetics is not as simple as once thought, and that epigenetics may be even more important and immediate in regards to human health.<sup>5</sup>

Humans process substances and toxins for neutralization and removal via a two step detoxification process aptly called phase I and phase II detoxification. These substances can be physiologic products, such as estrogen, or products of external exposure such as environmental toxins. Substances can become more toxic once processed through phase I, with the danger being amplified if phase II is not efficient enough to complete processing of that toxin or if anti-oxidant capacity is insufficient. Increasingly, to understand the mechanism of illness, and of environmental exposure induced illness in particular, it is necessary to understand the intricate system of biotransformation and the variability of genetic predisposition.

This becomes especially important considering that we know through body burden studies that all Americans are accumulating multiple potentially harmful chemicals derived from our environment, within them.<sup>6,7</sup> Environmental chemicals that are lipophilic have the capacity to become stored in body fat indefinitely.

Biochemical enzymes of importance for detoxification include the wide ranging family of cytochrome p450 (CYP 450) enzymes (phase I) and, glutathione-S-transferases (GST), N-acetyl transferases (NAT) and super oxide dismutases (SOD) (phase II) to name a few. For the most part, rather than being “diseased” enzymes, these enzymes differ from individual to individual much the same as the external characteristics of people vary. You could think of it as akin to the consequence seen when a light skinned, blond haired person stays in the sun the same length of time as a darker skinned more sun tolerant person. Same exposure. Different result.

Given the current scientific knowledge base, any discussion of indiscriminate and unavoidable exposure of an entire population to any environmental substance must include knowledge of and acceptance of the biotransformation, carcinogenic, inflammatory, hormonal and other biochemical consequences of such exposure by that substance in order to be fully informed. The science has expanded beyond a simple exposure and symptom production model.

### **Particle Effects**

Of first concern regarding the Checkmate LBAM-F spray is the vehicle of delivery.

An independent analysis by Dennis L. Knepp, Ph.D. and Jeff Haferman, Ph.D. has shown the polyurea capsule size to be an average of approximately 17 microm and a median of at most 10 microm.<sup>3</sup> Thus, the presence of particles less than or equal to 10 microm can

be expected with the spray. Particle sizes 2.5-10 microm are referred to as PM10 and are considered inhalable into the deeper lung. In comparison, the Consensus Statement of the Department of Pesticide Regulation reports a particle size of 25 microm. Particles of 10 microm can be expected to reach the bronchioles but not the deepest lung.<sup>8</sup> Particles smaller than 10 microm, however, can reach into the lower bronchioles and alveolar areas, with the smallest, theoretically, reaching the deepest.

We know that pollen and subpollen can reach the lower airways.<sup>9</sup> Larger particles can be expected to lodge, be exhaled, be expectorated or be swallowed. Individuals with impaired ciliary sweeping action or cough efforts can be expected to have increased lodging. In a small human study, particles of 6, 8 and 10 microms were inhaled. Retention after 24 hours was 100% in the ciliated bronchioles and 20% in the large and small ciliated airways.<sup>8</sup>

There is no information on how lodging will be affected by the surfactant, tricapyryl methyl ammonium chloride, or polyvinyl alcohol, the plastic resin emulsifier. The tricapyryl methyl ammonium chloride MSDS identifies hazard for ingestion and inhalation. Also, mouth breathers would bypass the nasal filtration mechanism. Little is known about the fate of inhaled particles in children, but children may be at increased risk.<sup>10</sup>

We have no data on what will happen to the size of particles as they age. All scenarios involve the dispersal over an extended 30-90 day time period of the chemical contents of the capsules so that at least some constant chemical exposure can be expected. There has been no examination of the deposition pattern and the effect of prolonged repetitive exposure lasting multiple years, to the Checkmate LBAM-F spray in human lung and respiratory tissues. It is unclear how much atmospheric pollutant matter will adhere to the water encased capsules and what additive hazard that will cause.

Particulate matter of the PM10 type has been associated with increased hospital admissions for myocardial infarction, congestive heart failure and possibly ischemic cerebral vascular stroke.<sup>11,12,13</sup> PM10 exposure has also been linked to increased blood coagulation and altered heart rate variability.<sup>14,15</sup>

Multiple studies have found that coarse particles of 2.5-10 microm (PM10) are involved in a pro-inflammatory cascade involving bronchial epithelial cells and alveolar macrophages with cytokines such as TNF (tumor necrosis factor), IL-6 and Cox-2 and increased bone marrow polymorphonuclear leukocytes (PMN) and monocyte production. Toll-like receptors in macrophages appear to be reduced. The inflammatory cascade results in vascular endothelial dysfunction, possibly resulting in PM10 related atherosclerotic vascular events.<sup>16,17,18,19</sup>

Coarse particles of 2.5-10 microm (PM10) are more potent at inducing inflammatory cytokines than smaller particles.<sup>16,20</sup> Coarse PM10 particulate matter has caused inflammation, regardless of the location of sampling and has been associated with increased TNF alpha and glutathione depletion, an indication of oxidative stress, though

oxidative stress appears to be greater at smaller particle size. TNF alpha and IL8 are also seen to extend to sampled blood.<sup>16, 21,22</sup>

It cannot be concluded that larger particles will not have untoward consequences, as particles need not reach the deep lung to have adverse effects. Inflammatory and biotransformation cascades can result from inhalation at the proximal respiratory system as well.<sup>30</sup> Bioorganic pollutants activate toll-like IL-1 receptors, then activating TNFkB, followed by proinflammatory cytokines. Associated metals can induce reactive oxygen species causing damage to lipids, proteins and DNA. Stress activated protein kinases incite activation of transcription factors with chronic inflammatory reactions of the mucous membrane of the upper respiratory tract. Chronic inflammation from constant activation of mucin genes causes goblet cell hyperplasia. This leads to dysregulation and hyperviscous secretion with impaired mucocilliary transport, allowing colonization. The mucous membrane of the nose and tracheobroncheal tree is the most active metabolic organ after the liver.<sup>23,24,25,26,27</sup> It is the site of both phase I and phase II biotransformation with polymorphisms in these enzymes implicated as possible contributors to head and neck tumours.<sup>27,28,29</sup> Xenobiotics have been shown to be metabolized by a wide variety of cytochrome P450 enzymes in multiple areas of the respiratory system, including the bronchial and bronchiolar epithelium, Clara cells, type II pneumocytes and alveolar macrophages.<sup>31</sup>

There has been no study looking at inflammation and biotransformation cascades triggered by the capsules or chemical constituents of the Checkmate spray.

The capsules themselves, cross linked polyurea polymer, could be either urea formaldehyde or phenylhexylurea. We know very little about the actual polymer, its characteristics when inhaled, or, human response to it. We do know that formaldehyde in other inhalation scenarios can produce respiratory, eye, nose and throat irritation. Animal inhalation studies show high acute toxicity. Female workers using urea-formaldehyde resins have shown menstrual disorders. And, the EPA considers formaldehyde to be a probable human carcinogen.<sup>32</sup> There has been no study of the effect of urea on inflammatory and biotransformation cascades.

Aerial spray substances can be expected to redistribute into households via air and foot transport. Studies in communities with pesticide treatment have shown movement of pesticides from outdoors to indoors. Residents in those studies experienced indoor inhalation, dermal contact and oral ingestion of outdoor contaminants. Carpets and fabric were seen to be significant source of accumulation.<sup>33,34,35</sup>

### **BHT: Mechanisms of Lung and Liver Injury**

Butylated Hydroxytoluene (BHT), also known as 2,6-di-tert-butyl-4-methylphenol, is commonly used in studies to induce lung damage and cancer so that they can be studied. The damage from BHT appears to come about because CYP1B1 (cytochrome P450 1B1) biotransforms BHT, during phase I detoxification, into a much more toxic adduct, BHT quinone methide (BHT-QM), which is an unstable electrophile that requires conjugation

to glutathione, a strong antioxidant. Thus, a toxin or carcinogen can be activated by the cytochrome P450 system. Cytochrome P450 enzymes vary from person to person, are determined by genomic predisposition and can be inhibited or induced by various pharmaceutical medications and foods. BHT has also been shown to inhibit GST P1-1 (a glutathione S-transferase enzyme subtype), a phase II enzyme. Thus, when exposed to BHT, it is not only changed into something more toxic (via CYP1B1), but the mechanism to remove that more dangerous toxin during phase II (via GSTP1) is also slowed. The damage is worse when glutathione, a strong anti-oxidant, is depleted. In combination, this serves to compound and prolong toxicity. These effects are seen consistently across many studies.

There are no studies in humans examining inhaled BHT.

BHT is currently banned in food products in, Australia, Japan, Romania and Sweden.

In addition to the more toxic activated forms of BHT, resulting pathologic and compensatory cascades come into play, which in turn can be affected by individual capacity. In mouse lung, BHT metabolized to its more toxic quinone methide (BHT-QM), has been found to substantially increase lipid peroxidation, hydrogen peroxide and superoxide, with inhibition of the anti-oxidant proteins peroxiredoxin 6 (Prx6) and Cu-Zn-superoxide dismutase (SOD1).<sup>36</sup> In mice, BPPOH-QM has been found to be even more toxic than BHTOH-QM and at only half the dose.<sup>37</sup>

Glutathione S-transferase P1-1 is over expressed in tumors. GST P1-1 also protects cells from unstable molecules and oxidants, and plays a regulatory role for stress kinases. GSTP1 has been found to be more abundant than other GST isoforms in tumorigenic cells. Treatment with BHT-QM decreased GSTP1 activity by 28-44%, with inhibition exacerbated by glutathione depletion, thus decreasing cellular protection and influencing cell growth.<sup>38</sup>

Though Checkmate is not a classic pesticide, pesticide-exposed fruit growers with GSTP1 genetic polymorphisms have been found to have increased risk of DNA damage.<sup>39</sup>

Prevalence of GST P1 (+/- and +/+) polymorphisms with reduced efficiency are present in 48 % of the population. GSTP1 is found predominantly in lung, while GSTM1 is found predominantly in liver and is absent in about 50% of the population. GSTT1 activity is deficient in about 20% of Caucasians. Individuals with polymorphisms in all three GST's have been found to be at particularly increased risk for chronic lymphocytic leukemia, perhaps linking the role of environmental toxins to risk for CLL.<sup>40</sup> In addition to its role in detoxification of chemical toxins, CYP1B1 is an important estrogen metabolizing enzyme with variations occurring in normal populations. Medications can also inhibit the efficiency of CYP 1B1. Individuals with polymorphisms can be expected to be at increased risk of complications from exposure to substances utilizing these various detoxification pathways.

The Clara cells of the lung bronchioles appear to be a major source of BHT metabolism and site of BHT induced damage. Clara cells are secretory cells in the bronchioles of the lungs. They protect the bronchiolar epithelium by secreting surfactant and detoxifying harmful inhaled substances. They perform their detoxification duties via cytochrome P450 enzymes. The bronchioles reside between the larger airways and the deep lung and 10 microm particles can be expected to lodge there. Investigation has determined that 10 microm and smaller particles are the smaller end of the spectrum of particle size seen for the Checkmate LBAM-F spray. It is unknown what changes may be seen in particle size, over time, of lodged particles. Furthermore, no testing has been done to see where and how much lodging would be seen in humans of varying age and respiratory characteristics.

In mice, BHTOH, more so than BHT, causes lung damage and tumor development by killing bronchiolar Clara cells and inhibiting lung epithelial gap junction intercellular communication.<sup>41</sup> BHT has also been shown to inhibit epithelial gap junctions in liver as well as lung.<sup>42</sup>

The bronchiolar Clara cells of the lung have been found to be the major site of pulmonary xenobiotic metabolism in mice, converting BHT to the more toxic adduct, BHTOH. Substantial amounts of BHTOH further converted to the even more toxic BHTOH-QM. BHTOH and BHT were both toxic to the Clara cells, and the toxicity and metabolism, as in other studies, was reduced with a CYP450 inhibitor.<sup>43</sup>

BHT has also been seen to cause lung damage with death of alveolar type I pneumocytes and proliferation of subsequent replacement with type II cells via inflammatory response involving bronchiolar Clara cells.<sup>44</sup>

BHT toxicity is not confined to the lung but also affects the liver. BHT has been found to decrease liver cell viability by 80% upon exposure in rats. At the same time, intracellular glutathione levels decreased prior to the onset of cytotoxicity. And, CYP450 inhibition attenuated the toxicity.<sup>45</sup> Electron microscopy of rat liver cells fed BHT has shown widespread hepatotoxicity.<sup>46</sup>

### **Inflammatory and Immune Manifestations**

The use of BHT to induce lung injury in laboratory animals brings up several issues. One is the simple fact that BHT is so commonly used to induce injury. This begs the question of what the effect of extended inhalation and ingestion of BHT in humans would be. The second issue is the variety and cascade of events that it seems capable of setting off and the regulatory mechanisms that are involved. Third, some of the resulting events, such as inflammation, may hold information regardless of how the inflammation was induced and could perhaps be applicable to inflammation of other causation. It appears that inhaled Checkmate capsules will be an additional source of inflammation, as discussed previously.

Severe airway disease with increased mast cells and increased mast cell degranulation has been seen when using BHT to induce lung injury in mice with Forkhead Box F1 (+/- transcriptional factor expressed in endothelial and smooth muscle cells in lung. Increased CXCL12 (chemokine ligand 12, a leukocyte activator and proinflammatory stimulant) was seen, which is essential for mast cell migration and chemotaxis. Looking at embryos, it was found that, during lung development, there was a marked increase in pulmonary mast cells prior to birth, also associated with increased CXCL12 in lung.<sup>47</sup>

Mast cell degranulation in the lung in response to BHT brings up the possible relationship of mast cell degranulation at distant sites as well, such as the intestine. Was the diarrhea reported by some individuals after the 2007 spray mast cell mediated, regardless of the exact spray constituent that may have triggered it? Studies have shown profound ingested allergen induced mast cell mediated diarrhea in the absence of histamine, associated with Th2 intestinal inflammation, IgE, serotonin and platelet-activating factor.<sup>48</sup>

Studies have also found relationships between BHT, inflammation and carcinogenesis. BHT treated mice were found to have common chromosomal locations regulating both inflammation (via cyclooxygenase-2 (COX-2) induction), and carcinogenesis, with the conclusion that pathogenic inflammatory mediators play a role in tumor development.<sup>49</sup> Toll-like receptors (TLR's) have also been found to modulate chronic lung inflammation and tumorigenesis in mice given BHT to induce lung injury.<sup>50</sup>

In addition to its endocrine-disrupting characteristics, benzophenone has also been shown to cause strong polarization to Th2 inflammation via depletion of intracellular glutathione levels and modulation of IL-10 and IL-12 with exacerbation or airway inflammation in an allergic asthma model.<sup>51</sup>

GST polymorphisms have been implicated as increased risk factors for asthma in association with environmental exposures.<sup>52</sup>

The issues of lung irritation, asthma, and emphysema are not a small or theoretical problem. From 2001 to 2003, according to the California Health Interview Survey, asthma and difficulty breathing was found to increase to 6 million individuals. 3.4 million Californians had asthma-like symptoms, such as wheezing, but not classified as asthma. Nineteen percent of children age 5 or under were affected.<sup>53</sup> Also as of 2003, according to the National Conference of State Legislatures, asthma in California cost the state \$720 million in direct medical expenses and \$544 million in lost school and work days for a cost to the state of greater than \$1.2 billion.<sup>54</sup>

### **Benzophenones and Hormone Disruption**

Benzophenones, often used as UV binders, are estrogen receptor binders. The particular benzophenone used in Checkmate LBAM-F, 2-hydroxy-4-n-octyloxybenzophenone, does not appear to have been tested. An extensive testing of potential xenobiotics included benzophenones, but not 2-hydroxy-4-n-octyloxybenzophenone.<sup>55</sup>

In a Japanese study, benzophenone and derivatives were tested for estrogenic activity. Fifteen showed estrogenic activity. Of those benzophenone substances that were estrogenic, four were more estrogenic than bisphenol-A.<sup>56</sup> Bisphenol-A has been associated with developmental abnormalities and the later development of breast cancer on the basis of its estrogenic activity.

Bisphenol-A, at the time of this writing, is in the process of being banned in Canada for use in baby bottles. A bill has also been introduced into the United States Senate to institute a ban of bisphenol-A in infant and early childhood products. There have been no studies on the effect of long term inhaled benzophenone. But the possibility exists that it is potentially as damaging or more so than bisphenol-A.

Benzophenones have been shown to have estrogenic and anti-androgenic activity. Benzophenone-2 in utero exposure causes hypospadias, perhaps via estrogen receptor signaling.<sup>57</sup> Benzophenones have also been shown to affect not only the estrogen receptors, but also the pituitary, uterus and thyroid.<sup>58</sup>

It appears that benzophenone can affect sex hormone receptors by using a pregnane X receptor (PXR) to activate CYP3A, which in turn induces higher concentrations of effective metabolites leading to endocrine disruption.<sup>59</sup> As with all cytochrome P450 systems, inter-individual variability can be expected. Benzophenone and its metabolites also appear to have genotoxic potential via activation by human P450 2A6 and NADPH-cytochrome P450 reductase, which allowed benzophenones to show umu gene activation.<sup>60</sup>

## **Thyroid**

In addition to effects on the reproductive system, there is increasing evidence that endocrine disrupters affect the thyroid and the hypothalamic-pituitary-thyroid axis.<sup>61</sup>

Benzophenone-2 has been found to inhibit thyroid peroxidase (TPO) more than methimazole or propylthiouricil (PTU), two anti-thyroid medications used for hyperthyroidism, thus having a hypothyroid effect. This was more pronounced in the absence of iodide.<sup>62</sup> Meanwhile, BHT in rat diets has caused increase in iodine uptake.<sup>63</sup>

A Brazilian study found those with GSTP1 polymorphisms to have increased risk for papillary and follicular thyroid carcinomas.<sup>64</sup> If BHT is relevant in the presence of GSTP1 polymorphisms in respiratory tissues, the possibility must be entertained that it could be associated with thyroid illness as well.

## **Carcinogenesis**

The advancements in the understanding of carcinogenesis are rapidly expanding. Key is the incorporation of the concept of genetic predisposition, which is turning out to be multi-factorial rather than single gene related. Some of the single nucleotide

polymorphisms of note include CYP1B1, and the GST family. It is perhaps not surprising then that these polymorphisms present in recurring themes.

As previously described, CYP1B1 is active in the biotransformation of BHT to a toxic BHT-quinone adduct. CYP1B1 is a major enzyme responsible for the formation of 4-hydroxyestradiol, which is genotoxic. CYP1B1 also activates polycyclic aromatic hydrocarbons and heterocyclic aromatic amines, which are mammary carcinogens in animals.

Study has shown that women with breast cancer express variations of glutathione-S-transferase and cytochrome P450 genotypes. Different combinations appear to alter susceptibility to breast cancer and prognosis depending on race, age and environmental exposures. For example, in Caucasian women, CYP1B1 seems to be associated with a poorer prognosis, particularly with the absence of GSTT1.<sup>65,66</sup> Women with CYP1B1 polymorphisms appear to be at higher risk for breast cancer when exposed to xenobiotics that induce CYP1B1.<sup>67</sup>

BHT has also been shown to strongly increase DNA methyl transferase in liver, kidney, heart, spleen, brain and lungs while altering methylation of total DNA and various genes in rats.<sup>68</sup> Localized methylation in the usually unmethylated promoter regions of genes, together with increased expression of DNA methyltransferase, has become a recent important topic of research as an etiology of cancer promotion.<sup>69</sup>

GSTM, GSTP and GSTT appear to be involved in an array of cancers, with environmental toxin exposures that involve them thought to play a part in carcinogen activation.<sup>39,40,64</sup>

### **Current Directions in Medical Understanding and Pre-Exposure Probability**

The stronger the pre event probability, the more likely the association being examined is likely to be true and related. This concept becomes especially important when the characteristics in question are common and could be attributable to a number of things.

The best true and related answers can come only after asking the most pertinent questions. We are just beginning to be able to ask the right questions in the realm of environmental exposures and our evolving view of human biology. Increasingly, these questions not only involve symptom generation, but also, the very earliest precursors to later symptoms.

But truths exist regardless of our ability to ask the right questions or figure out the right answers. An earthquake will happen at whatever magnitude it occurs regardless of our ability to predict it or measure it correctly. Likewise, if a river is dammed and the floodplain developed, when nature's force exceeds the capacity of the riverbank, the river will overflow and the floodplain will flood. The more the insult exceeds the capacity to cope with it, the worse the potential disaster.

As humans, we are not invincible. If we flood our systems with that which exceeds our natural coping capacity, we pay the consequences.

A report by the Office of Environmental Health Hazard Assessment, the Department of Pesticide Regulation and the California Department of Public Health determined there was found to be no causative effect of the September, October and November 2007 Santa Cruz and Monterey spray on reported symptoms.<sup>70</sup> This conclusion was not based upon findings, but rather, upon lack of useful data gathering. However, lack of appropriate data gathering has no bearing on the actual occurrence or non-occurrence of a situation being studied. It simply reflects our inability to document it. It does not reflect the truth. Likewise, data gathered appropriately but absent the right questions does not reflect the truth. Given what is known about the biochemical actions of the chemicals involved in the spray and current knowledge of human biology, there exists the possibility of an increased pre-exposure probability that could make the symptoms reported more likely to be related to the spray than random.

Symptoms reported after the 2007 spray included widespread respiratory system complaints, eye, nose and throat irritation, sinus bleeding and skin rashes. Generalized symptoms included headaches, dizziness, gastrointestinal pain and diarrhea and muscle aches, malaise and fatigue. Breast and menstrual symptoms were reported as were cardiopulmonary symptoms such as tachycardia and arrhythmia. The symptoms reported were common symptoms and potentially attributable to a number of things. But viewed within the time window of the spray, and in conjunction with the known mechanisms of toxicity of some of the spray constituents, together with potential population genomic predisposition and particulate effects, the probability of causative association with the spray is elevated and could potentially make those complaints more probably associated with the spray. This will remain a statistical uncertainty.

An added issue with toxicants in general is the multi-factorial nature of their actions and the systems they affect. This adds layers of complexity that scientific method has difficulty accommodating. However, this relates to our difficulty in devising a method of unbiased study, not on the presence or absence of such multi-factorial actions. It is fair to say that numerous studies are bearing out the previously unrecognized biologic actions of a wide variety of environmental toxins.

Lastly, genomic predisposition testing, including for the polymorphisms discussed in this writing, is in use currently and can be expected to increase, particularly with the likely passage of the Genetic Information Nondiscrimination Act (GINA). Markers of oxidative stress and inflammation are also available. Furthermore, it is likely that our understanding will continue to progress so that relationships that are not apparent or confirmed currently may be so in the not too distant future.

## **Conclusion**

The 21<sup>st</sup> century has brought with it a new paradigm of biomedical understanding. The advent of biochemical, genetic and epigenetic understanding is incomplete but expanding

rapidly. While we may not know all of the specifics at this point, they will come. What we do know is that new layers of explanation have been opened before us as well as an explosion of questions. Even though it is early, we are discovering a highly integrated and complex web of organization.

What is clear is that individuals experience unique predispositions to illness dictated by individual biochemistry, genetics, epigenetics and exposures. In the majority of cases, illness is a manifestation of placing a normal spectrum of individual biochemistry and genetics into an environment it is ill equipped to cope with, whether it be dietary, habit, stress or environmental exposure. This forces us to come to grips with the likelihood that using averages to make statistical medical decisions, will give way to using meaningful sub areas within the curve, depending upon individual variability. This raises the complexity and challenge of the medical investigations that we use to make complex decisions.

When viewed from this perspective, the symptom complaints after the 2007 Checkmate spray in Monterey and Santa Cruz are more likely to be true, because of heightened pre-event probability, than random. One could even argue that the complaints may have under-represented the true presence of symptoms. We know there is variable genomic predisposition in the detoxification pathways of the population and that at least some of the ingredients of the Checkmate spray are known to interface with these pathways. We know that these pathways can involve complex cascades of inflammation and regulation. We know that there is known hazard associated with particular mater. There exist plausible explanations for lung irritation and toxicity, endocrine disruption, inflammation, immune system triggering and, in some predisposed individuals, depletion of anti-oxidant coping capacity. We know that the particle size of the Checkmate LBAM-F spray can trigger these same complex pathways.

Given what we know, it is reasonable to conclude that, because of individual genomic predisposition and the expected biochemical behavior of the chemicals and encapsulated delivery mechanism involved in the proposed apple moth spray, a percentage of the population can be expected to experience a variety of symptoms and illness from the spray, either immediately or at some time in the future. There exists no testing of the Checkmate LBAM-F product that clarifies any of these specific scientific concerns, nor does there appear to be any plan to do so. Any decision to spray must weigh the danger of the pest, all other available methods to solve the problem, and, whether or not any need to spray justifies the illness that will be caused by the spray, acutely or in the future.

In this author's view, attempting to eradicate the light brown apple moth with this spray is ill advised and not worth inducing the reasonably expected, and significant, illness consequences in the population.

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Author Affiliations: None. Dr. Haiden is an internist in private practice with a special interest in environmental, nutritional and behavioral impacts on health.

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# Local Scientists Spot Error in CDFA Analysis of LBAM Spray

April 16, 2008

*Press release announcing that the CDFa made an error in their analysis of the size of the particles contained in Checkmate.*

## FOR IMMEDIATE RELEASE

Contact: *Dennis Knepp, Ph.D.*  
831 373-7492

*Jeff Haferman, Ph.D.*  
831-277-8965

### **Local Scientists spot error in CDFA Analysis of LBAM spray**


Monterey, CA, April 16, 2008 – Two Monterey area scientists have spotted an error in an analysis of the particle size of the spray being used to combat the light brown apple moth (LBAM). Dr. Dennis Knepp and Dr. Jeff Haferman recently reviewed data provided by the California Department of Food and Agriculture (CDFA). The CDFA analysis claims that there are relatively few small particles in the “Checkmate” LBAM spray being used.

Knepp and Haferman, however, found that the CDFA made a subtle error in their review. “The CDFA stated that only 1.2% of the particles in the Checkmate spray were smaller than 10 microns, which is a critical size for inhalation to deep within the lungs, however, they based their computations on particle volume, not number of particles”, Haferman stated. Knepp explained that when the analysis is corrected “we find the average particle size to be about 17 microns with significant numbers of much smaller particles.” The scientists cited research that shows the expected mass concentration of the Checkmate spray could cause an increase in mortality rates by 7 per cent.

“Our analysis shows that the small particle sizes from the Checkmate spray can cause significant health issues, and the CDFA needs to take a step back and re-consider their own datasets” said Knepp.

Knepp has a Ph.D. in Electrical Engineering and has published over 50 peer-reviewed papers in the areas of Geophysics and Electrical Engineering. Haferman has a Ph.D. in Mechanical Engineering, and has published over a dozen papers in the fields of Meteorology and Engineering, and also sits on the Monterey City Council.

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# Light Brown Apple Moth Eradication Program Update

October 20, 2007

*News release from the CDFA that a temporary restraining order halting the eradication efforts in Monterey had been lifted, that eradication efforts were scheduled to resume immediately, and that the Governor had ordered the makers of CheckMate to release the ingredients to the public.*

# News Release

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE



## Media Contacts:

Jay Van Rein, CDFA Public Affairs, (916) 654-0462 or (916) 502-7447

Arnold Schwarzenegger, Governor  
A. G. Kawamura, Secretary

## Light Brown Apple Moth Eradication Program Update:



Release #07-086

[Print This Release](#)

*MONTEREY COUNTY SUPERIOR COURT LIFTS TEMPORARY RESTRAINING ORDER, GOVERNOR ORDERS ERADICATION PROGRAM TO RESUME AND INGREDIENTS TO BE MADE PUBLIC*

SACRAMENTO, October 20, 2007, Saturday, October 20, 2007 - Following the lifting of a temporary restraining order on the Light Brown Apple Moth (LBAM) eradication program, Governor Arnold Schwarzenegger directed California Department of Food and Agriculture (CDFA) to immediately resume eradication efforts for this dangerous pest. The Governor also directed CDFA to make public the list of ingredients in the pheromone being used for this program.

Monterey County Superior Court Judge Robert O'Farrell lifted a restraining order yesterday after determining that the ingredients used in the pheromone Checkmate LBAM-F made by Oregon-based Suterra did not contain chemicals known to be harmful to the public.

"The Governor and Suterra have upheld a commitment to keep Californians and the foods we eat safe and healthy," said Secretary Kawamura. "My department will ensure a safe eradication of a pest that has the capability of crippling our agriculture and nursery industries, damaging our environment and raising the cost of putting fresh food on our families' tables."

The ingredients in Checkmate LBAM-F are:

Water

(E)-11-Tetradecen-1-yl Acetate

(E,E) -9,11 Tetradecadien-1-yl Acetate

Crosslinked polyurea polymer

Butylated Hydroxytoluene

Polyvinyl Alcohol

Tricaprylyl Methyl Ammonium Chloride

Sodium Phosphate

Ammonium Phosphate

1,2-benzisothiazoli-3-one

2-hydroxy-4-n-octyloxybenzophenone

"Governor Schwarzenegger made it very clear that, to the maximum extent possible under US trademark law, the list of ingredients in the product used to eradicate the Light Brown Apple Moth should be disclosed to the public," said Secretary Kawamura. "The Governor supports the public's right to know every ingredient in the product and is confident that full disclosure will confirm what my Department, the California Environmental Protection Agency and California Department of Pesticide Regulation established before treatment began—that Checkmate LBAM-F is non-toxic to humans, plants, animals and insects."

“California has what is considered the strictest and most comprehensive state pesticide regulatory program in the nation,” said Mary-Ann Warmerdam, Director of Cal-EPA’s Department of Pesticide Regulation. “My department will continue to assist the LBAM task force in performing further analysis and monitoring to ensure that the community’s concerns are fully considered.”

#### Next Steps in the Eradication Program

The release of the ingredient list in Checkmate LBAM-F follows an announcement on Friday, October 19, by the Monterey County Superior Court that a temporary restraining order was lifted, allowing aerial treatment on the Monterey peninsula to resume. The treatment will be applied on the nights of October 24-27, from 8 p.m. to 5 a.m., weather permitting. Notices including these new dates will be mailed to all known addresses in the treatment area by U.S. mail in advance of the treatment.

CDFA has arranged to send e-mail updates to subscribers announcing intended areas of treatment, weather permitting. And on mornings following treatment, CDFA intends to e-mail subscribers with results of the just-completed application. E-mails will include a link to a map showing the progress of the treatment. Those interested in receiving e-mail updates may sign up at:

[http://www.cdfa.ca.gov/phpps/PDEP/lbam/lbam\\_main.html](http://www.cdfa.ca.gov/phpps/PDEP/lbam/lbam_main.html).

Public meetings remain scheduled next week to inform residents and respond to concerns about the aerial pheromone treatments. The meeting schedule is as follows:

Santa Cruz - Monday, October 22

Cocoanut Grove Grand Ballroom

400 Beach Street.

5 pm to 7 pm - Informational Open House

7 pm to 10 pm - Presentation and Public Comment

Santa Cruz -Tuesday, October 23

University Inn and Conference Center

611 Ocean Street

4:30 pm to 7:30 pm - Informational Open House

7:30 pm to 11 pm - Presentation and Public Comment

Salinas - Wednesday, October 24

Echo Valley Elementary School 147

Echo Valley Road

5 pm to 7 pm - Informational Open House

7 pm to 9 pm - Presentation and Public Comment

Salinas - Thursday, October 25

Salinas Community Center - 940 N. Main Street

4 pm to 6 pm - Informational Open House

6 pm to 9 pm - Presentation and Public Comment

Salinas - Friday, October 26

Salinas - Cesar E. Chavez Elementary School - 1225 Towt Street

5:30 pm to 7:30 pm - Informational Open House

7:30 pm to 10 pm - Presentation and Public Comment

The issue-neutral moderators are former state Assembly Member and current Santa Cruz County Treasurer Fred Keeley who will serve as moderator of the Santa Cruz meetings, and Monterey County public affairs specialist Candace Ingram who will facilitate the Salinas meetings.

The light brown apple moth is of particular concern because it can damage a wide range of crops and other plants including the Central Coast’s prized cypress, as well as redwoods, oaks and many other varieties commonly found in our urban and suburban landscaping, public parks, and natural environment. The list of


agricultural crops that could be damaged by this pest includes grapes, citrus, stone fruits (peaches, plums, nectarines, cherries, apricots) and many others. The complete host list contains well over 1,000 plant species and 250 crops. The pest damages plants and crops by feeding on leaves, new shoots and fruit.

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*The California Department of Food and Agriculture protects and promotes California's \$31.8 billion agricultural industry. California's farmers and ranchers produce a safe, secure supply of food, fiber and shelter; marketed fairly for all Californians; and produced with responsible environmental stewardship.*

California Department of Food and Agriculture Office of Public Affairs  
1220 N St., Ste. 214, Sacramento, CA 95814  
916-654-0462, [www.cdfa.ca.gov](http://www.cdfa.ca.gov)



# Light Brown Apple Moth Eradication Program: Key Questions and Issues

October 26, 2007

*CDFA's responses to questions raised regarding the LBAM  
and the eradication project.*

# Light Brown Apple Moth Eradication Program

## Key Questions and Issues

*Presented by Assemblymember John Laird, October 16, 2007*

*Response by the California Department of Food and Agriculture, October 26, 2007*

### 1. INERT INGREDIENTS

#### 1.1 How will CDFA and USDA resolve the controversial issue of the inert ingredients being part of a trade secret in advance of further spraying?

On October 19, Monterey County Superior Court Judge Robert O'Farrell lifted a restraining order after determining that the ingredients used in the pheromone Checkmate LBAM-F did not contain chemicals known to be harmful to the public.

On October 20, Governor Schwarzenegger directed CDFA to make public the list of all ingredients in the Checkmate product.

All the ingredients in Checkmate LBAM-F are:<sup>1</sup>

- 1) Water—the main ingredient.
- 2) (E)-11-Tetradecen-1-yl Acetate—the pheromone.
- 3) (E,E) -9,11 Tetradecadien-1-yl Acetate—the pheromone.
- 4) Ammonium phosphate—commonly used in "crystal growing" kits for children and as a plant nutrient.
- 5) 1,2-benzisothiazol-3-one—used as antibacterial and antifungal agents in a variety of products.
- 6) 2-hydroxy-4-n-octyloxybenzophenone—used in sunscreen and in lots of products made of plastics, including food containers; useful for its UV-blocking properties.
- 7) Crosslinked polyurea polymer—commonly used in manufacturing of plastics such as polyurethane foam production, waterproofing, insulation, and micro encapsulation agent for pesticides.
- 8) Butylated Hydroxytoluene—common food preservative.
- 9) Polyvinyl Alcohol—Odorless, non-toxic polymer commonly used in shampoos and cosmetics, feminine hygiene and incontinence products, children's play putty, glue, lubrication drops for hard contact lens wearers and other products.
- 10) Tricaprylyl Methyl Ammonium Chloride—commonly used in the manufacture of various pesticides and pharmaceuticals; contributes to product purity.
- 11) Sodium Phosphate—a sodium salt, naturally occurring substance important in every cell in the human body, helps regulate pH. Sodium phosphate is also an additive in egg products and is a prescribed laxative prior to procedures such as colonoscopy.

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<sup>1</sup> Note: One point of controversy has been a news report—now established as erroneous—that the chemical polymethylene polyphenyl isocyanate (PPI) was an inert ingredient in the Checkmate formulation. The U.S. EPA has confirmed that this chemical is not a part of the products being used in the eradication project. The U.S. EPA further clarified that all of the actual ingredients "have been evaluated for safety and have been found to meet the agency's requirements for the protection of human health and the environment."

## Light Brown Apple Moth Eradication Program Key Questions and Issues

As Secretary Kawamura has stated, “The Governor supports the public's right to know every ingredient in the product and is confident that full disclosure will confirm what my Department, the California Environmental Protection Agency and California Department of Pesticide Regulation established before treatment began—that Checkmate LBAM-F poses no risk to human health, plants, animals and insects.”

California has what is considered the strictest and most comprehensive state pesticide regulatory program in the nation. The Department of Pesticide Regulation will continue to perform further analysis and monitoring to ensure that the community's concerns are fully considered.

### **1.2 Is CDFA and USDA considering review of the ingredients by an independent third party?**

U.S. EPA has stated that, “Based on low toxicity in animal testing, and expected low exposures to humans, no risk to human health is expected from the use of these pheromones.” DPR concurs with this conclusion. These agencies are third-party reviewers and are independent of CDFA and USDA. Further, they are charged with the evaluation of products, such as Checkmate, and have the authority to require all information to conduct a complete review. This includes all the confidential details of the materials that go into the manufacturing process. CDFA and USDA do not have such authority.

Since the list of all the ingredients was made public, the local media has asked several chemists and toxicologists to comment on the nature of the ingredients. None of these outside reviewers have indicated any concern for the safety of the product. In the October 23, 2007, [Santa Cruz Sentinel](#), Harry Elston, a chemist with Midwest Chemistry Safety, stated that, “These compounds have a long history of safe use in this and many other applications.”

CDFA and the Monterey Bay National Marine Sanctuary agreed to an independent laboratory test of the pheromone used in the eradication project, Checkmate LBAM-F. The UC Davis Marine Pollution Studies Laboratory conducted this test in early October and confirmed that the pheromone would not be injurious to sea life. Beyond this study, neither CDFA nor USDA is currently considering another third-party review.

## **2. HEALTH COMPLAINTS**

### **2.1 When and how will results of the Department of Pesticide Regulation-led taskforce analyzing the epidemiology be reported? Will it be before the next round of spraying?**

It is a misconception that the Department of Pesticide Regulation-led group is, in fact, a formal task force. This ad hoc group of state scientists, led by DPR, is tasked with developing a scientific consensus of DPR and the Office of Environmental Health Hazard Assessment, with

## **Light Brown Apple Moth Eradication Program Key Questions and Issues**

input from scientists from the Department of Public Health, on the available health and safety data of the pheromone products and on the health complaints taken as a whole. This document is not intended to be a detailed human health risk assessment, an epidemiological study of exposed individuals, nor an analysis of alternative approaches. This group will be issuing a "white paper" presenting their conclusions and recommendations for the signatures of the appropriate executives. The next round of spraying is not dependent on these deliberations.

### **2.2 Will CDFA implement a long-term study of health effects before, during and after spraying, as suggested by a number of health and elected officials?**

The conduct of health studies is not within CDFA's sphere of operational capacity. Instead, the department relies on experts in the public health sector for such studies. CDFA is working with the public health community and fully supports their efforts to establish appropriate health monitoring aimed at the detection of possible unforeseen adverse health events as a consequence of the LBAM eradication program. The department is doing—and will continue to do—all it can to facilitate studies that public health authorities regard as appropriate for evaluation of potential health impacts resulting from the LBAM eradication program.

### **2.3 Will CDFA be ready to commence this study in advance of any further spraying?**

The determination that spraying the LBAM pheromone does not pose a health threat to the public or environment is based on thorough evaluations done by the U.S. EPA and California Department of Pesticide Regulation. For the past decade, there have been no indications of adverse environmental or human health incidents from past uses in which exposures occurred. Further spraying is not dependent on this study.

### **2.4 In light of the more than 200 health complaints in Monterey County, do you believe it is accurate to state there are no reported adverse effects to humans when DPR's epidemiological analysis is ongoing and the possibility of undertaking a long-term study is being considered?**

Complaints are not the same as a medical determination based on objective criteria. CDFA is making every effort to keep track of all such complaints and continues to work with the public health community so that all illness complaints can be properly analyzed within the overall assessment of LBAM eradication activities. All toxicity data objectively developed to date strongly indicate that the probability that these complaints are pharmacologically linked to a toxic exposure is very unlikely.

## **3. ERADICATION PLAN AND ENVIRONMENTAL REVIEW**

### **3.1 When will the eradication plan be available?**

An overall programmatic eradication plan is currently being developed. CDFA is targeting late-December for completion. When completed it will be promptly made available to the public.

## **Light Brown Apple Moth Eradication Program Key Questions and Issues**

### **3.2 When will the CEQA review be completed?**

CDFA has now a signed contract for development of the environmental impact report. A draft should be available for public review by mid-summer 2008. It is targeted for completion in December 2008.

## **4. ENVIRONMENTAL ADVISORY TASK FORCE**

### **4.1 Who will serve on the Environmental Advisory Task Force (EATF)?**

The Environmental Advisory Task Force is currently being formed. Letters inviting participants were mailed on October 25, 2007.

Task force invitations were sent to the following:

- Alliance for Food and Farming
- Cal Poly San Luis Obispo
- California Association of Winegrape Growers
- California Department of Fish and Game
- California Department of Forestry and Fire Protection
- California Department of Pesticide Regulation
- California Department of Public Health
- California Farm Bureau Federation
- Citrus Research Board
- Environmental Defense
- Monterey Bay National Marine Sanctuary
- Monterey County Resource Conservation District
- Natural Resources Defense Council
- Nature Conservancy
- Organic Farming Research Foundation
- Pesticide Action Network of North America
- Santa Clara University Environmental Studies Institute
- Sierra Club-Ventana Chapter
- Sustainable Conservation
- University of California Aquatic Toxicology Research Group

### **4.2 When will their work be underway?**

The first meeting of the Environmental Advisory Task Force will be held in mid-November.

## **Light Brown Apple Moth Eradication Program Key Questions and Issues**

### **4.3 What can we expect in terms of results?**

The goals of the Environmental Advisory Task Force are to:

- Foster two-way communication between CDFA and environmental stakeholders.
- Discuss environmental issues and make recommendations.
- Provide third-party participation in the CEQA process.
- Recommend future research strategies.
- Provide recommendations regarding environmental issues.

## **5. PHEROMONE MATING DISRUPTION EFFICACY**

### **5.1 Can you provide information on the effectiveness of PMD to eradicate, not just control, an invasive species?**

Pheromone mating disruption is a proven insect control technique. The recommendation to use PMD as a primary tool for LBAM eradication in California came from the USDA-Technical Working Group. This recommendation is a direct result of their first-hand knowledge of the available scientific literature, personal research experience and the efficacy of mating disruption in field applications in Australia and New Zealand when used in control programs. The TWG recommended an overall strategy of containment, suppression and eradication using an integrated approach, primarily employing pheromone release for mating disruption.

The TWG's overriding recommendation is that the CDFA and USDA adopt a long-term goal of eradicating LBAM from the U.S. This is based on the available knowledge of the current distribution and population levels in California and the likely impacts to agricultural and natural systems. LBAM has a continuous life cycle with no true dormancy. Projections made with developmental data from Australia suggest that the moth could complete four to five generations annually along the Central Coast and San Francisco Bay Area.

Because this is a newly introduced pest, overall population levels are still relatively low. Low population levels are critical to the success of the PMD strategy. Another critical factor is that the LBAM population in California is isolated and not prone to continual reestablishment.

Allowing these densities to build up by not maintaining pheromone levels could necessitate insecticide use. The intent is to keep the LBAM population down to a point more responsive to mating disruption.

## Light Brown Apple Moth Eradication Program Key Questions and Issues

**5.2 Can you specifically describe and assess the damage currently being inflicted in Santa Cruz County (where the infestation is most acute) in terms of both nurseries/crops and non-commercial/public/backyard areas?**

In Santa Cruz County, the primary damage has been economic in nature due to the LBAM quarantine. The quarantine is in place to protect the rest of California and the nation. Since this infestation is in its early stages, the pest is just beginning to establish itself. More larval feeding damage, both in the environment and in food crops, will be apparent as the population builds.

In Australia, when insecticides are not applied, typically between 5 percent to 20 percent of fruit is damaged, but this can exceed 30 percent. In New Zealand, damage to unsprayed crops commonly reaches 50 percent (Wearing et al., 1991). More information regarding potential economic impact in California may be found in the environmental assessment prepared by USDA at [www.aphis.usda.gov/plant\\_health/ea/downloads/lbam\\_ea\\_sc.pdf](http://www.aphis.usda.gov/plant_health/ea/downloads/lbam_ea_sc.pdf).

In 10 of California's affected counties<sup>2</sup>, it is estimated that LBAM could cause \$160 to \$640 million in losses. These estimates were derived from the agricultural impacts in Australia and New Zealand.

**5.3 With regard to the sanctuary permit, how will LBAM be eradicated within the "buffer zone" along the coastline?**

CDFA maintains protocols designed to prevent drift movement into the Monterey Bay National Marine Sanctuary. In recognition of these protocols, the sanctuary provided CDFA with a permit allowing treatment activities in the Monterey/Seaside area.

The protocols include use of specially designed nozzles, wind speed application restrictions and buffer zones. Aerial applications will be made with the following buffer zones designed to prevent drift out of the treatment area:

- 100 meters at average wind speeds of zero miles per hour (mph).
- 200 meters at average wind speeds of four mph.
- 300 meters at an average wind speed of eight mph.
- No applications will be made at average wind speeds of 10 mph or higher.

CDFA and USDA will develop ground-based alternatives limited to use within the buffer zones.

**5.4 When and how frequently will CDFA report on the efficacy of spraying?**

The Light Brown Apple Moth Act of 2007 (SB 556, Wiggins) requires CDFA to report to the Legislature on January 10, 2008, and annually thereafter while the program is ongoing, regarding its expenditures, progress and priorities in combating LBAM in California.

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<sup>2</sup> Alameda, Contra Costa, Marin, Monterey, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz and Solano.

## **Light Brown Apple Moth Eradication Program Key Questions and Issues**

In preparation of this reporting requirement, the USDA and CDFA will meet in late-December 2007 with the USDA's Technical Working Group to review the trapping data following each round of aerial pheromone releases.

**5.5 When will the results of the first Monterey County spraying be released?**

It will take time to evaluate the effectiveness of pheromone mating disruption as monitored by trapping. LBAM is a new introduction to North America, and we are learning more about the moth's biology in this new environment. CDFA will continue to collect and analyze the trapping data to help determine the efficacy of the spraying program, with results available in spring 2008.

**5.6 What would constitute a successful "eradication" of LBAM (e.g., zero captures over a certain period)?**

As we anticipate that this will be a multi-year program, success will be evidenced by fewer and fewer trap catches. Ultimate success is declared after no insects are trapped for a prescribed number of life-cycle generations.

**5.7 What is your "Plan B" if PMD fails to eradicate LBAM?**

Please see question 7.4 for a description of the LBAM research plan. CDFA will continue to fast-track research into additional eradication options. Any "Plan B" would involve a reassessment of the eradication methodologies based on the tools that we have available.

**5.8 If rain or other weather/seasonal conditions impede your ability to spray, how will CDFA respond?**

If rain or other seasonal conditions impede CDFA's ability to apply the pheromone by air, then we will reschedule the application for the next fair-weather evening.

**5.9 Under what circumstances (i.e., what, when, where, how) would CDFA use insecticides in residential areas in conjunction with or following PMD or instead of PMD?**

Except as described in 5.3, the program will reevaluate its efficacy and options during the winter. In addition, the USDA's Technical Working Group will meet again in December 2007 to evaluate the program.

**5.10 Would insecticide applications be conducted under the department's existing emergency authority?**

Yes, as described in the Proclamation of an Eradication Project. The following is a list of options for eradication of LBAM: 1) foliar application of an organic pesticide by ground; 2) foliar application of an organic pesticide or a pheromone by air; 3) mating disruption using pheromone-infused plastic twist ties; 4) mass trapping; and 5) quarantine measures.

## **Light Brown Apple Moth Eradication Program Key Questions and Issues**

### **6. THIRD-PARTY REVIEW**

#### **6.1 When will specific and detailed information on the third-party data that exists be available in a format understandable and accessible by the general public?**

The joint USDA/CDFFA LBAM program is in the process of contracting with the U.S. Geological Survey (USGS) to provide third-party review of existing environmental data relevant to the use of pheromones. The USGS should have a review ready for the public by summer 2008. CDFFA public affairs staff will work to ensure the report's readability.

A report of third-party analysis on aquatic toxicity from the UC Davis Marine Pollution Studies Laboratory and the UC Davis Department of Environmental Science should be available by mid-November 2007.

### **7. ALTERNATIVES TO AERIAL SPRAYING**

#### **7.1 Can you be more specific on why implementing a twist tie approach is "impossible" with respect to efficacy, labor and funding?**

CDFFA, in conjunction with USDA and TWG, have evaluated alternatives to aerial release of the LBAM pheromone in this area and believe this is the most effective strategy for application of mating disruption over such a large area. Mass trapping is not known to be effective, and ground release of the pheromone using the available twist-tie technology is not logistically feasible in the Monterey and Santa Cruz areas. These moths mate where there is tree foliage for egg laying. We estimate for an area the size of the Monterey/Seaside zone (38,000 acres) it would require four-to-five days, 9.5 million twist ties and 62,000 people. The large area requiring treatment in Santa Cruz, along the Central Coast and San Francisco Bay Area precludes the use of this approach.

#### **7.2 Under what circumstances could CDFFA move from aerial spraying to twist ties?**

A decision to employ twist ties or other pesticides will be made based on moth population levels and proximity to sensitive and buffer areas.

#### **7.3 While waiting for alternatives such as sterile moths, could a "contain and control" program be implemented?**

CDFFA believes that we currently have viable tools for eradication. Waiting until sterile moth technology is available would guarantee permanent establishment and spread of LBAM in California.

## **Light Brown Apple Moth Eradication Program Key Questions and Issues**

### **7.4 Has the department developed an LBAM research plan with clear objectives and timelines?**

California Department of Food and Agriculture staff is undertaking a research program on alternative methods to eradicate LBAM from California. The principle CDFA investigator has been in contact with LBAM researchers in Australia, New Zealand and Hawaii (USDA). Last month, in order to assess the feasibility for release of sterile male LBAM, researchers looked at the Pink Bollworm Sterile Insect Technique in Phoenix, Arizona. In addition, CDFA staff will keep the Environmental Advisory Task Force updated and apprised as to the status of this research as well as work with them to develop any new research ideas.

In particular, CDFA staff has started the following projects:

#### **1) Use of Trichogramma wasps as a biocontrol agent**

CDFA scientists are working with USDA scientists in Albany, California, to develop an LBAM colony as the first step in conducting this research. The initial collections of suspect LBAM larvae have been made, and these larvae have developed into moths that are laying eggs. Tests will be started as soon as sufficient eggs are available to continue the colony and provide “excess” eggs for testing. Trichogramma wasps will be procured to determine if the wasps will attack LBAM eggs and, if so, whether the wasp larvae can complete their development in the LBAM eggs and produce viable adults. Our initial plan is to release large numbers of the Trichogramma wasps in areas to reduce LBAM numbers either alone or in conjunction with pheromone disruption or attract and kill treatments. We hope to have this technology, if feasible, available by summer 2008.

#### **2) “Attract and kill” technology**

USDA Agricultural Research Service (ARS) scientists will work with their colleagues in Australia and New Zealand to evaluate an attract and kill technology for use against LBAM male moths. This would involve depositing large numbers of spots of LBAM pheromone mixed with a carrier and a contact insecticide throughout an area. The male moths would be attracted to the spots and killed as they moved over the pheromone spot looking for the female moth they believe is there. Attract and kill has been used to control other moths in the eastern United States. Attract and kill technology could be used in conjunction with the release of Trichogramma wasps. If feasible, it is anticipated that this technology might be available in late 2008.

#### **3) Use of sterile male moths**

USDA ARS scientists will work with their colleagues in Australia and New Zealand to continue efforts to develop sterile moth technology for LBAM. At present this technology is at least two to three years away. The technology lacks a mechanized diet mixing and dispensing system, larval rearing system and moth sterilizing system as well as a mechanized system to disperse the sterile moths. Both the Australian and New Zealand governments are moving forward on this front. The USDA ARS and CDFA scientists are bringing their expertise on the mass rearing and release of fruit flies and moths to bear on this effort.

## **Light Brown Apple Moth Eradication Program Key Questions and Issues**

### **4) Classical biological control**

CDFA scientists are working University of California researchers and 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 leafroller moth larvae. These tests require a colony of LBAM and colonies of native leafrollers. CDFA and USDA scientists are developing the necessary colonies in Sacramento and Albany. USDA requires the preference tests before they will approve the release of exotic wasps in the United States. It is anticipated that no releases of these wasp will occur before spring 2009.

### **7.5 Have any of the USDA funds been designated for LBAM research in California or the U.S.?**

Yes, see question 7.4.

## **8. ERADICATION ZONES**

### **8.1 What are the protocols for expanding the spray area when there are new LBAM finds beyond, but in proximity to, the existing perimeter?**

Treatment areas are expanded as new moths are identified. The expansion is generally based on a 1.5-mile radius from the new find, but the proximity to prior finds and other treatment zones may influence the determination of the new boundary.

### **8.2 If the spray area is expanded, how and when will residents be notified?**

All residents in the affected area will be notified by first-class mail, followed by an informational open house.

## **9. MONITORING**

### **9.1 When will the DPR monitoring data from Monterey County (September 9-12) be available?**

Under DPR supervision, CDFA's Center for Analytical Chemistry has completed the analysis of the samples. DPR is still evaluating the data. There has been a delay in issuing a report because DPR staff have been in the field and have not met to correlate field and analytical data. The report should be issued in November.

### **9.2 What was the methodology?**

The Department of Pesticide Regulation has performed tests on samples that were taken from all treatment equipment used for the aerial application operations (tanks, pumps, hoses, valves, spray booms, water trucks, etc.). Specific tests were:

- A pesticide screen test was performed at the Center for Analytic Chemistry. This test detects pesticides or contaminants prior to the commencement of treatment.

## **Light Brown Apple Moth Eradication Program Key Questions and Issues**

- Following the mixing and loading of the pheromone into the aircraft, a tank sample was taken from each nozzle on the spray boom.
- Deposition cards were placed in various situations, such as schools, public areas, tops of hills and private property. These cards indicate the quantity of pheromones that reach the ground. These cards are under the control of DPR for use in any analysis it might conduct. These results are used to make any calibration changes to the aircraft equipment, buffer areas or flight lines, if necessary.
- Each sample was tagged with a unique number and an associated chain of custody form.

Samples from these tanks and equipment were directly taken by DPR and were tested by CDFA's Analytical Chemistry laboratory under DPR supervision for the presence of any other pesticides. All tests were negative. Further, DPR took tank samples of the Checkmate product mix during aircraft loading procedures to test for the proper concentrations of active ingredients. These samples were taken and processed under a strict chain of custody, under the supervision of DPR. The results were reported to both CDFA and DPR.

During each spray application, monitoring dye cards were placed throughout the application area to ensure evenly distributed coverage throughout the area, and if any spray droplets are observed outside target areas.

### **9.3 Will all future applications be monitored by DPR?**

Yes, testing and monitoring are standard operating procedures for all CDFA eradication programs.

## **10. LBAM ECONOMIC IMPACTS**

### **10.1 What do we know today about actual economic losses caused directly by the pest itself?**

See answer to question 5.2.

### **10.2 How are LBAM-related economic losses being monitored and reported?**

There is no process to monitor LBAM-related losses.

## Light Brown Apple Moth Eradication Program Key Questions and Issues

### 11. NURSERY INDUSTRY IMPACTS

#### 11.1 What research is being fast tracked?

CDFA requested that USDA fast track research to identify alternatives to organophosphates, such as chlorpyrifos, that are effective against the LBAM eggs.

Specifically, we requested that the research trials fast track horticultural oils, since preliminary screening results showed that many oils were as effective, if not more effective, as chlorpyrifos against LBAM eggs. The preliminary screening results did not provide sufficient data for the USDA to authorize this use as an alternative. However, because these oils showed early promise, CDFA requested that USDA follow-up with additional trials to determine their usefulness as an alternative.

#### 11.2 What monitoring and reporting requirements does CDFA or growers have with respect to the use of chlorpyrifos?

The Department of Pesticide Regulation (DPR) oversees a multi-tiered enforcement program. The U.S. Environment Protection Agency enacts laws covering minimum pesticide requirements that are enforced at the state and county levels through cooperative agreements. Over the years, the California Legislature has passed more stringent laws covering pesticide registration, licensing, the sale and use of pesticides, and worker protection.

DPR has primary responsibility to enforce pesticide laws and regulations in California. The Enforcement Branch oversees compliance with pesticide use requirements, has overall responsibility for pesticide incident investigations, administers the nation's largest state monitoring program for analyzing domestic and imported produce for pesticide residues, and ensures compliance with pesticide product registration and labeling requirements.

County agricultural commissioners enforce federal and state pesticide laws and regulations at the local level. Agricultural commissioners issue site-specific local permits for the use of restricted materials, conduct on-site application inspections, administer full pesticide use reporting, conduct worker safety inspections, and investigate pesticide incidents. More information is available at the department's Web site:  
[www.cdpr.ca.gov/docs/enforce/enf\\_auth.htm](http://www.cdpr.ca.gov/docs/enforce/enf_auth.htm).

#### 11.3 What are the potential "downstream" impacts on the region's water quality and the sanctuary?

Due to increased regulated and nonregulated pesticide use, the potential for negative downstream impact increases if eradication is not successful.

## **Light Brown Apple Moth Eradication Program Key Questions and Issues**

- 11.4 Local nursery owners are spending considerable funds to implement regulations requiring the spraying and quarantines of infected stock. Has CDFA set aside funds from the USDA monies to provide financial assistance to the nursery industry (and other growers) impacted or potentially impacted by LBAM?**

Not at this time. USDA funding for LBAM is approved for the following: eradication operations, research into alternative eradication methods and public outreach.

- 11.5 What is CDFA's plan to work with the retail and wholesale nursery industry to expeditiously implement greener and less costly alternatives?**

CDFA plans to continue to cooperate with the USDA and Australian researchers working on the organophosphate alternatives research. We intend to review all data with the USDA as soon as it is available to determine if new products can be incorporated into our current list of authorized treatment options.

Treatment options available to infested wholesale nurseries are the same as they have been since the infested nursery protocols were developed. They are available for review in our Online regulatory procedures manual. There is one extra treatment/systems approach option available to retail nurseries that is not available to wholesale nurseries, because retail nursery stock is not as likely to leave the quarantine area as is wholesale nursery stock.

- 11.6 What is the process for growers and nursery owners to provide input that could impact CDFA/USDA protocol?**

There is an LBAM Nursery Task Force in Santa Cruz County comprised of nursery growers, UC Cooperative Extension specialists and Natural Resource Conservation Service staff. Nursery stakeholders in Santa Cruz developed the task force for the purpose of providing input to CDFA and USDA regarding regulatory protocols. CDFA intends to continue working with this group until we have developed a mutually agreeable program.



# Judge Halts Moth Spraying in Monterey County

May 13, 2008

*SF Chronicle article about the Superior Court ruling in Monterey County declaring the “emergency” invalid and putting a halt on spraying. The CDFA is appealing.*

## Judge halts moth spraying in Monterey County

Tuesday, May 13, 2008

**(05-12) 18:42 PDT Monterey** -- State agriculture officials plan to appeal a superior court judge's ruling that halts aerial spraying to eradicate the light brown apple moth in Monterey County until an environmental impact report can be completed.

Monterey County Superior Court Judge Robert

O'Farrell ruled today that the discovery of the moth - a pest that is considered a threat to the state's agricultural economy - does not constitute a legal emergency. He ordered the aerial spraying of a moth pheromone pesticide stopped until a report on the environmental effects of the spraying operation can be completed in January.

A.G. Kawamura, state agriculture secretary, said the state Department of Food and Agriculture would appeal the decision immediately, combining it with a similar decision two weeks ago in Santa Cruz County.

"The light brown apple moth infestation is, in fact, an emergency that threatens our nation's food supply and our state's environment," he said in a prepared statement.

The moth species was first detected in Berkeley about a year ago, and specimens have since turned up in Monterey, Santa Cruz, Santa Clara, San Mateo, Contra Costa, Marin, San Francisco, Solano, Napa, Los Angeles and Santa Barbara counties. The state agency plans to spray a synthetic pheromone pesticide over much of the Bay Area this summer in hopes of getting rid of the pest by interrupting its mating cycle.

Gov. Arnold Schwarzenegger had halted planned spraying in the 12 counties until Aug. 17 to allow safety tests to be completed.

*Michael Cabanatuan*

<http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/05/13/BA1B10L7U0.DTL>

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# U.S.: No Funds to Run Pesticide Survey

May 22, 2008

*News article regarding the discontinuation of the US Department of Agriculture's national survey tracking pesticide usage. The discontinuation comes in the wake of budget cuts, but prominent scientists, farming organizations, and environmental groups.*

## U.S.: No funds to run pesticide survey

Farmers and environmental groups agree it should be maintained

The Associated Press

updated 9:43 a.m. PT, Thurs., May. 22, 2008

FRESNO, Calif. - Consumers and farmers will soon be on their own when it comes to finding out which pesticides are being sprayed on everything from corn to apples.

The U.S. Department of Agriculture said Wednesday it plans to do away with publishing its national survey tracking pesticide use, despite opposition from prominent scientists, the nation's largest farming organizations and environmental groups.

"If you don't know what's being used, then you don't know what to look for," said Charles Benbrook, chief scientist at The Organic Center, a nonprofit in Enterprise, Ore. "In the absence of information, people can be lulled into thinking that there are no problems with the use of pesticides on food in this country."

Since 1990, farmers and consumer advocates have relied on the agency's detailed annual report to learn which states apply the most pesticides and where bug and weed killers are most heavily sprayed to help cotton, grapes and oranges grow.

The U.S. Environmental Protection Agency also uses the fine-grained data when figuring out how chemicals should be regulated, and which pesticides pose the greatest risk to public health.

### 'Not much that we can do'

Joe Reilly, an acting administrator at the National Agricultural Statistics Service, said the program was cut because the agency could no longer afford to spend the \$8 million the survey sapped from its \$160 million annual budget.

"Unless new funds are made available there's not much that we can do," Reilly said.

While the agency "hates eliminating any report that is actually needed out in the American public," he said consumers could find similar data from private sources.

Still, only a handful of the major agricultural chemical companies spend the approximately \$500,000 it costs to buy a full set of the privately collected data each year, according to a letter written by an advisory committee to the agency.

Most farmers can't afford to pay for the information and environmental groups use it to analyze which chemicals could turn up in local water supplies or endanger critical species.

Eliminating the program "will mean farmers will be subjected to conjecture and allegations about their use of chemicals and fertilizer," said Don Lipton, a spokesman for the American Farm Bureau. "Given the historic concern about chemical use by consumers, regulators, activist groups and farmers, it's probably not an area where lack of data is a good idea."

### Industry also used data

Pesticide companies also rely on the program when they're looking to reregister agricultural chemicals, said Beth Carroll, a senior stewardship manager with Syngenta Crop Protection, Inc.

Reilly said the agency would "love to reinstate the program," but said for now it will only do key surveys. Those include the monthly crop report, which influences commodity prices on the futures market, and livestock reports, which set the price for hogs and cattle.

At a time when consumers are increasingly curious about what goes into their food, farmers, chemical companies and advocacy groups said the cuts would have wide-ranging affects.

"What we'll end up doing is understanding pesticide use through getting accident reports," said Steve Scholl-Buckwald, managing director at the San Francisco nonprofit Pesticide Action Network. "And that's a lousy way to protect public health."

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