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Light Brown Apple Moth in California:

Quarantine, Management, and Potential Impacts

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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
- Onderstand 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).



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

University of California Agriculture and Natural Resources UC Statewide Integrated Pest Management Program



This publication is available online at http://www.ipm.ucdavis.edu/EXOTIC/lightbrownapplemoth.html Published July 17, 2007 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.