Lymantria albescens

*For regulatory purposes, the two subspecies, *L. d. asiatica* and *L. d. japonica,* and the three revised species in Pogue and Schaefer (2007), *L. albescens*, *L. postalba*, and *L. umbrosa*, are all considered Asian gypsy moths.

Specific information for this species is limited. When information specific to *L. albescens* is unavailable, information on Asian gypsy moths (AGM) as a group has been used.

Figure 1. Adult male (top) and female (bottom) of *Lymantria albescens* (Image courtesy of Michael Pogue, USDA-ARS).

Scientific Name
Lymantria albescens Hori and Umeno, 1930

Synonyms:
Lymantria dispar ab. *albescens* Matsumura 1927
Lymantria dispar albescens Hori and Umeno 1930
Lymantria albescens albescens Schintlmeister 2004

Common Name
Okinawa gypsy moth (OGM), albescens gypsy moth

Figure 2. Larva of *Lymantria albescens* (Image courtesy of Michael Pogue, USDA-ARS).

Type of Pest
Moth

Taxonomic Position
Class: Insecta, **Order:** Lepidoptera, **Family:** Lymantriidae*

*Recent classifications lower Lymantriidae to the subfamily Lymantriinae under the family Erebidae. See Pogue and Schaefer (2007).

Reason for Inclusion in Manual
PPQ Pest of Concern

Pest Description
Eggs: No description available.

Larvae: A full description of the larvae can be found in Pogue and Schaefer (2007). The length of mature larvae is 53 mm (approx. $2\ ^{1}/_{16}$ in) with a head width of 6.36 mm (approx. $^{1}/_{4}$ in).

Pupae: No description available.

Adults: A full description of the adults can be found in Pogue and Schaefer (2007).

"Male forewing ground color is variably suffused with brownish gray, resulting in specimens that range from white to mostly light brown. The lines of the forewing vary with intensity from quite distinct to almost absent. The marginal band in the hindwing is also variable; in darker individuals it is distinct and well-developed, but in lighter specimens it is only a diffuse spot near the outer apex" (Pogue and Schaefer, 2007).

> Male genitalia: "Lateral processes absent from tegument; uncus elongate, narrow, apex round; valve undivided, not fused ventrally; dorsal process contiguous with costal margin of valve, straight, apex narrowly rounded; juxta a broad ovate plate with convex dorsal margin; sacculus apex sharply rounded forming an acute angle; saccus narrow, U-shaped; aedoeagus slightly bent medially; vesica an ovate, ventrally produced lobe; cornuti absent" (Pogue and Schaefer, 2007).
>
> Female genitalia: The female genitalia are the same as in *L. postalba* except the ductus bursae is shorter than it is in *L. postalba*. "Ovipositor not telescopic; papillae anales quadrate, dorsal margin truncate; anterior and posterior apophyses short; ventral plate of ostium bursae broad, U-shaped, with vertical indentations or medial pockets, apices of these pockets merge medially…corpus bursae ovate" (Pogue and Schaefer, 2007).

Biology and Ecology

Females generally attach egg masses to small twigs in such a way to suggest mimicry of certain moth cocoons (Pogue and Schaefer, 2007). In Okinawa, larvae hatch in early March and adults emerge in early June. *L. albescens* can have 5 to 8 larval instars (Tsukagoshi and Higashiura, 2009).

In Okinawa, males are diurnal, mostly flying during morning hours. Their light color and active and erratic flight behavior may lead to them being mistaken for butterflies. Female adults are also capable of flight (Pogue and Schaefer, 2007).

Damage

There is limited information available on damage caused by *L. albescens*. In general, the main damage by Asian gypsy moths (AGM) is caused by larvae defoliating host trees. Infestations can lead to defoliation of trees. If defoliation

is repeated, trees can become weakened and susceptible to disease. Tree mortality may also occur with repeated defoliations.

Pest Importance

This species is confined to limited areas of semitropical islands and has a smaller host range than other species in the *L. dispar* complex. However, this species may be able to extend its host range if introduced into suitable areas and has the potential to become a pest.

In general, AGM can cause weakening of host plants through repeated defoliation. This can lead to tree mortality or an increase in tree susceptibility to diseases and other pests. The byproducts of an infestation (silk strands from caterpillars, frass, destroyed leaves, and dead moths) would be a nuisance to homes, yards, and parks (USDA, 2003).

Known Hosts

Castanopsis sieboldii (chinkapin), *Elaeocarpus sylvestris*[1], *Eucalyptus* spp. (Eucalyptus)[2], (*Eucalyptus camaldulensis*), *Ficus microcarpa* (Chinese banyan)[3], and *Macaranga tanarius* (blush macaranga) (Pogue and Schaefer, 2007; Tsukagoshi and Higashiura, 2009).

[1]Larval food source (Pogue and Schaefer, 2007).
[2]Experimental host (Nasu et al., 2004).
[3]Egg masses were collected off *F. microcarpa*, suggesting that this species could be a host plant (Tsukagoshi and Higashiura, 2009).

Pathogen or Associated Organisms Vectored

This species is not known to vector any pathogens or other associated organisms. *Lymantria albescens* can cause dermatitis and other skin conditions due to the poisonous spines on larvae (Kano, 1977).

Known Distribution

Asia: Japan.

This species is only known to occur on the Ryukyu Islands of Japan, including Ishigaki and Okinawa (Pogue and Schaefer, 2007).

Pathway

AGM have the potential to spread rapidly due to the females' ability to fly and the extensive host range of the larvae. Larvae can move through wind dispersal by 'ballooning'. This is where larvae climb trees or other objects and drop on a silken thread resulting in their becoming wind-borne. Apart from natural spread, AGM are most likely to be moved through human assisted means, specifically through movement of material infested with eggs. Material can be anything from ships and shipping containers to firewood and automobiles. Egg masses are

extremely hardy and can tolerate both temperature and moisture extremes. Egg masses can remain viable for extended periods of time.

Because of the significance of ships and cargo as a pathway, the U.S. works in conjunction with other governments (Russia, Japan, China, and South Korea) to minimize AGM introductions. This is achieved through inspections and certifications of ships entering U.S. ports.

The risk associated with AGM travelling through international trade has also led to the development of a NAPPO Regional Standards for Phytosanitary Measures (RSPM), "Guidelines for Regulating the Movement of Ships and Cargoes Aboard those Ships from Areas Infested with the Asian Gypsy Moth." Human mediated spread can also occur across land through movement of firewood, timber, rail cars, automobiles, and other inanimate objects (USDA, 2011).

Species identified to the genus level (*Lymantria* sp.) have been intercepted 6 times at U.S. ports of entry. Only one of these instances was known to have originated from a country where AGM is known to occur. Species identified only as *Lymantria dispar* have been intercepted 16 times with 7 interceptions occurring on material originating from countries where AGM is known to occur. Almost all of these interceptions occurred on ships and their miscellaneous cargo (AQAS, 2012; queried January 25, 2012).

Potential Distribution within the United States

Pogue and Schaefer (2007) state that invasion potential into most of North America is minimal as this species only inhabits limited areas of certain semitropical islands. However, they do state that this species may be able to invade Florida, southern California, or Hawaii.

Survey

CAPS-Approved Method*:

The CAPS-approved method is a trap and lure combination. There are two trap options: the paper delta trap with two sticky sides or the milk carton trap. The lure is available in either a laminate or string dispenser. The laminate is effective for 84 days (12 weeks) and the string lure is effective for 180 days (6 months). Traps should be checked every two weeks. **It is critical that samples be collected regularly, stored properly, and submitted to the Otis Lab as soon as possible to maintain the integrity of the DNA (see Handling and Submission of Suspect AGM Specimens for Identification below).**

02/03/14: The length of effectiveness for the Gypsy Moth String Lure has been revised from 84 days (12 weeks) to 180 days (6 months). The Gypsy Moth Laminate Lure is still effective for 84 days (12 weeks).

For 2014 surveys, if it is appropriate for your climate/ planned survey season, please use the Gypsy Moth String Lures for the full 180 days. If you ordered the

string lures based on the 84 day length of effectiveness and have excess lures, please store the excess lures in unopened packages in a freezer for the next season. The lures may be stored for two years if stored in a freezer below 0°F.

IPHIS Survey Supply Ordering System Product Names:

1) Traps:
    - Milk Carton Trap
    - Paper Delta Trap, 2 sticky sides, Brown
    - Paper Delta Trap, 2 sticky sides, Green
    - Paper Delta Trap, 2 sticky sides, Orange
2) Lures:
    - Gypsy Moth Laminate Lure
    - Gypsy Moth String Lure
3) Pesticide Strip – DDVP (for use in milk carton traps only)

Trap Options

Use the following guidance to determine which trap type to use:

Paper Delta Traps:

Delta traps are used outside of areas that are generally infested with European gypsy moth, where catch is expected to be less than 10 moths per trap. The lure should be stapled inside the trap, to one of the non-sticky panels. The ends of the trap should be folded in. Trap color is up to the State and does not affect trap efficacy.

Milk Carton Traps:

The standard milk carton trap has a much higher capacity and should be used in areas where populations of European gypsy moth are established. The lure is typically stapled to a long garden tie that is, in turn, stapled to the inside of the trap at the top so that the lure hangs more or less in the center of the trap. A killing agent, a DDVP strip, is required for milk cartons traps. The DDVP strip should be stapled to the garden tie below the lure. The DDVP strip is effective for 8 weeks.

Trap Placement:

Traps should be hung in the immediate vicinity of preferred host trees. Milk carton traps should be hung using a string, tied to a branch of a host tree. Delta traps are most effective when attached directly to the bole of a host tree. If no host tree is available, another vertical surface such as a telephone pole can be used to hang the trap. Never hang the traps on branch tips.

Trap Spacing: When trapping for more than one species of moth (that require different lures), separate traps for different moth species by at least 20 meters (65 feet).

Survey Site Selection:
Traps should be placed in the immediate vicinity of preferred host plants.

Time of year to survey:
"Gypsy moths have one generation annually; timing of flight depends on local climate, and can vary from May or June in very warm areas to September in colder climates" (Lance, 2006).

*For the most up-to-date methods for survey and identification, see Approved Methods on the CAPS Resource and Collaboration Site, at http://caps.ceris.purdue.edu/.

Literature-Based Methods:
Trapping: The only major sex pheromone for *L. albescens* is (+)-disparlure. Field trapping experiments determined that *L. albescens* is indifferent to (7S,8R)-*cis*-7,8-epoxy-2-methyloctadecane (-)-disparlure. Males are inhibited by admixtures of either 2-methyl-(*Z*)-7-octadecene [2-me-7Z-18Hy] or (*7R,8S*)-*cis*-7,8-epoxy-octadecane [(+)-monachalure] (Pogue and Schaefer, 2007).

Males will respond to pheromone lures during mid-morning and late afternoon (Pogue and Schaefer, 2007).

Time of year to survey:
In Japan, male flight of *L. albescens* has been observed beginning in mid-May (Pogue and Schaefer, 2007).

Key Diagnostics/Identification
Molecular. Specimens that are suspected of being AGM should be submitted to the Center for Plant Health Science and Technology (CPHST) Otis Laboratory for testing. **It is critical that samples be collected regularly, stored properly, and submitted to the Otis Lab as soon as possible to maintain the integrity of the DNA. See Handling and Submission of Suspect AGM Specimens for Identification below.**

Keys to first instar larvae and last instar larvae of selected *Lymantria* species can be found in Pogue and Schaefer (2007).

*For the most up-to-date methods for survey and identification, see Approved Methods on the CAPS Resource and Collaboration Site, at http://caps.ceris.purdue.edu/.

Handling and Submission of Suspect AGM Specimens for Identification
Specimens that are suspected of being AGM should be submitted to the Center for Plant Health Science and Technology (CPHST) Otis Laboratory for testing (see Asian Gypsy Moth Trapping Submission Guidelines below). All specimens

collected outside of the EGM quarantine areas will be analyzed. Specimens collected within generally-infested areas will be analyzed based on sub-samples of total catch because of the large number of insects which can be caught in some areas. **It is critical that samples be collected regularly, stored properly, and submitted to the Otis Lab as soon as possible to maintain the integrity of the DNA.** If traps cannot be checked regularly, it may be considered to trap when flight is expected rather than spreading resources out across the whole season.

Sample Handling

As a general rule, traps should be checked and samples removed every two weeks in order to reduce the degradation of the specimen's DNA. High temperatures and high humidity speed degradation of specimens and trapping schedules should be adjusted accordingly. If stored unfrozen the specimens should be in containers (paper bags or boxes) which will promote drying. Plastic containers retain moisture that favors the growth of bacteria and fungi, which will quickly degrade the DNA. Specimens should be stored in a freezer if possible (if not, in a cool dry area) and shipped to the Otis Lab as soon as practical. Specimens should not be stored unfrozen for extended periods.

Sample Submission

Milk Carton Traps

- Layer moths loosely between wadded paper towels or tissue paper in a paper bag (brown lunch bag size) to prevent motion and specimen damage during shipment (one bag per trap; if more than one bag is required per trap, label appropriately). Label paper bag clearly with trap numbers matching paperwork.
- Staple or tape paper bag closed.
- Do not attach paperwork to individual bags.
- Do not use plastic bags or paper envelopes as these do not allow moisture release and thus promote fungal growth and decomposition of the moths.
- Do not send traps or paperwork for traps which contain no specimens.

Delta Traps

- Label each trap clearly with trap numbers matching paperwork.
- Package traps to avoid crushing during shipment.
- Do not attach paperwork to individual traps.
- Do not use Styrofoam peanuts or other small packaging materials that could potentially enter the traps.
- Do not disassemble the traps or remove moths from the trap.
- Do not ship traps with sharp staples exposed.

A PPQ Form 305 should be sent with each trap, stating the trap number, collection site, number of specimens (estimates okay), life stage, collection date, and date of last (previous) trap check (to determine maximum time that the moth

may have been in the trap prior to the check). Specimens should be shipped via next day delivery for Tuesday through Friday arrival. They should be shipped to:

Molecular Diagnostics Unit
USDA, APHIS, PPQ
CPHST Otis Laboratory
1398 West Truck Road
Buzzards Bay, MA 02542-1329

For questions you can contact John Molongoski at:
Email: john.j.molongoski@aphis.usda.gov
Phone: 508-563-9303 ext. 218
Fax: 508-564-4398

Asian Gypsy Moth Trapping Submission Guidelines

Specimens trapped in the field can be analyzed for the presence of Asian genetic markers by submitting the specimens to the CPHST Otis Laboratory. All specimens submitted from outside the generally-infested area will be analyzed. Because of the quantity of specimens submitted from within the generally-infested area, only a small fraction can be analyzed. **Collect captured moths a minimum of every two weeks to minimize DNA degradation of the specimens, more frequently in warm climates.**

Store specimens in a cool, dry location (frozen if possible).
Ship ASAP after collection

MILK CARTON TRAPS

DO layer loose moths between wadded paper towels or tissue paper in paper bag (brown lunch bag size) to prevent motion and specimen damage during shipment.

DO label paper bag clearly with trap numbers matching paperwork.

DO staple or tape paper bag closed.

DO NOT attach paperwork to bags.

DO NOT use plastic bags or paper envelopes as these promote fungal growth and do not allow moisture release.

DO NOT send traps or paperwork for traps which contain no specimens.

DELTA TRAPS

DO label each trap clearly with trap numbers matching paperwork.

DO package traps to avoid crushing during shipment.

DO NOT attach paperwork to traps.

DO NOT use Styrofoam peanuts for packaging.

DO NOT disassemble the traps or remove moths from the trap.

SHIPPING

DO send a PPQ Form 305 for each trap sent.
Include: • Trap number • Collection Date
• Collection Site • Life Stage
• No. of specimens (estimates OK)

DO package moths / traps to prevent crushing or motion during shipping. Moths must be received whole with antennae and legs attached to body.

DO ship via next day delivery for Tuesday through Friday arrival.

DO ship ASAP after each collection.

DO keep moths frozen until shipment.

DO keep specimens dry.

DO NOT attach paperwork to traps or bags.

DO NOT use Styrofoam peanuts with delta traps.

DO NOT send traps or paperwork for traps with no specimens.

SHIP TO:
John Molongoski
USDA, APHIS, PPQ
CPHST Otis Laboratory
1398 West Truck Road
Buzzards Bay, MA 02542-1329
- Voice: (508) 563-9303 ext 218
- Fax: (508) 564-4398
- Email: john.j.molongoski@aphis.usda.gov

PPQ Form 305 can be obtained from the Otis Lab via phone or email requests. Please do not hesitate to contact us if you have any questions.

Easily Confused Pests

Until recently, *L. albescens* was previously considered a subspecies of *L. dispar*. Differences in male genitalia are sufficient enough to establish *L. albescens* as a distinct species. “The distal process is longer in *L. albescens* than in *L. dispar*, and the apex is slightly broader (expanded) in *L. albescens*, than in *L. dispar*” (Pogue and Schaefer, 2007).

They may be mistaken for butterflies due to their light color as well as their active and erratic flying behavior (Pogue and Schaefer, 2007).

Commonly Encountered Non-targets

The trap and lure for Asian gypsy moth can also trap *Lymantria monacha* (nun moth) (although there is a more optimal trap and lure for this species). It may also trap *L. obfuscata* (Indian gypsy moth), *L. concolor* (concolorous tussock moth), and *L. mathura* (rosy moth) (Lance, 2006).

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This datasheet was developed by USDA-APHIS-PPQ-CPHST staff. This pest is included as a target in the Asian Defoliator Survey. Additional information can be found in the **Asian Defoliator Pathway-based National Survey Guidelines**. Cite this document as:

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Revised February 3, 2014: Revised the length of effectiveness of the Gypsy Moth String Lure.