Asian Gypsy Moth

Lymantria dispar asiatica

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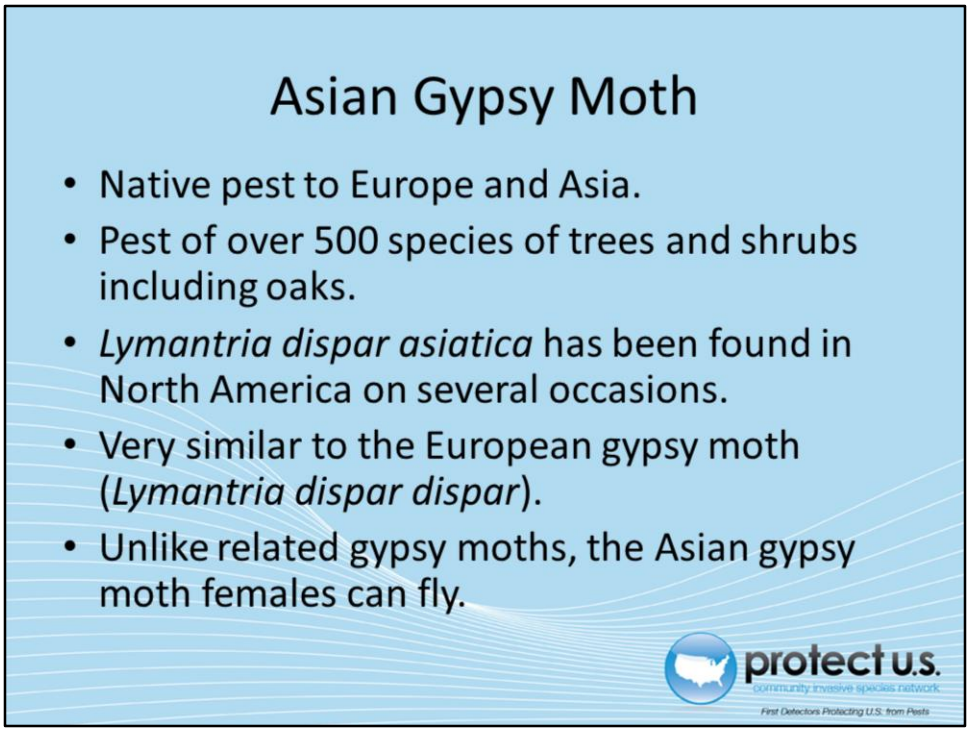
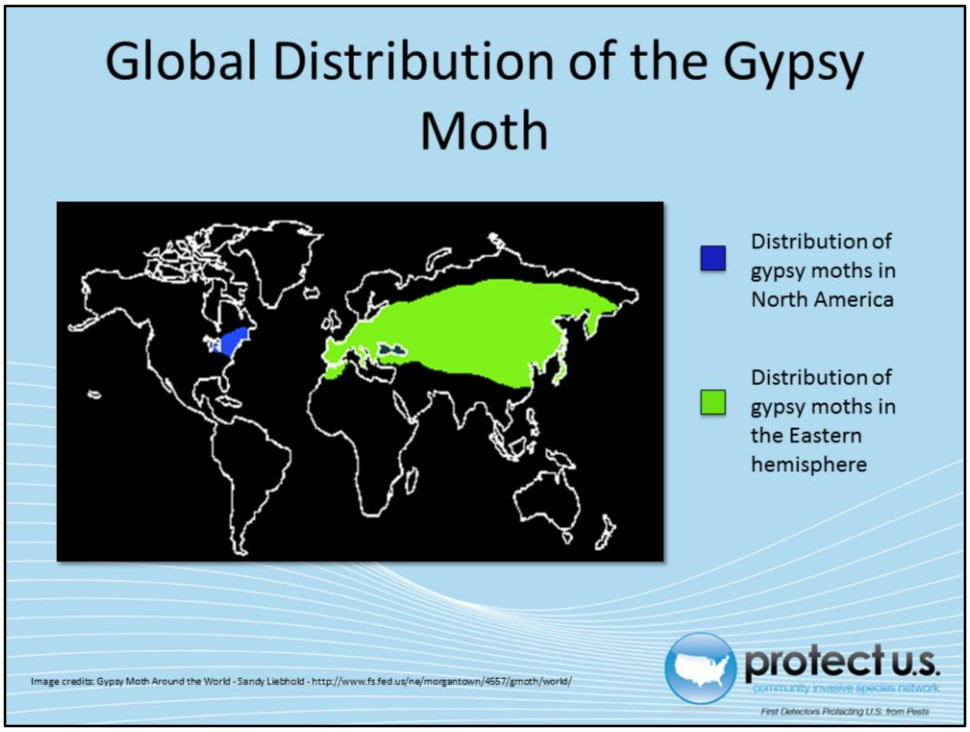


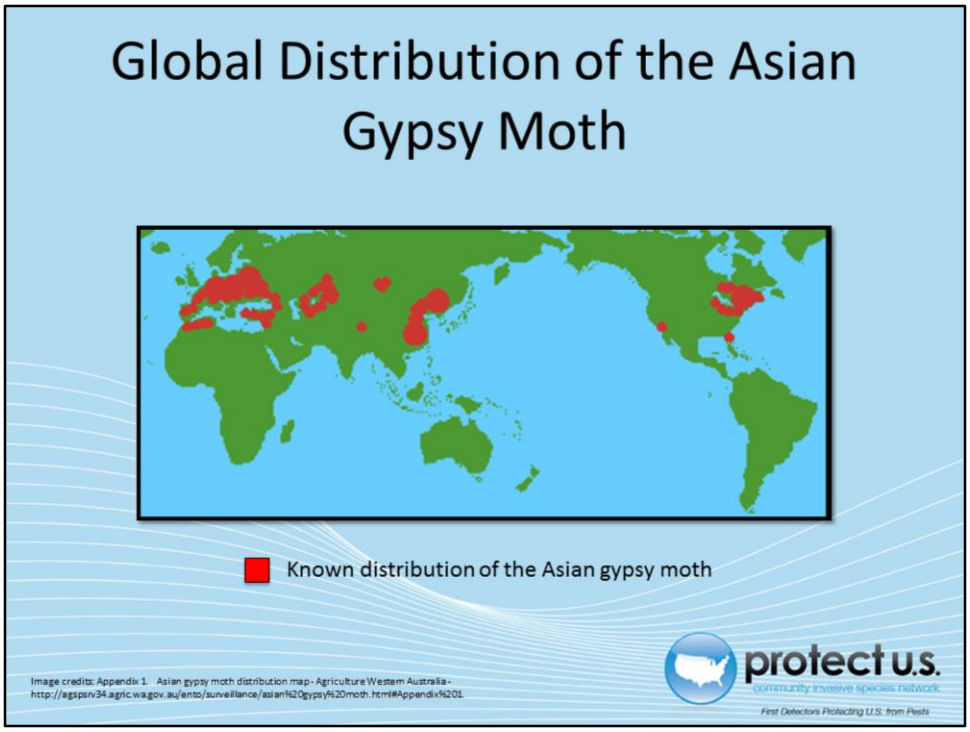
The Asian gypsy moth or *Lymantria dispar asiatica* is a native pest to Europe and Asia. They are a pest of over 500 species of trees and shrubs including oaks. It has been found on several occasions in North America, but successful programs have eradicated local outbreaks. The Asian gypsy moth is very similar in appearance and biology to the European gypsy moth (*Lymantria dispar dispar).* This pest in particular poses a higher risk than related moths because the females can fly. As a result, the spread of the pest could be much faster than others.

Information sources: 1, 2, 6



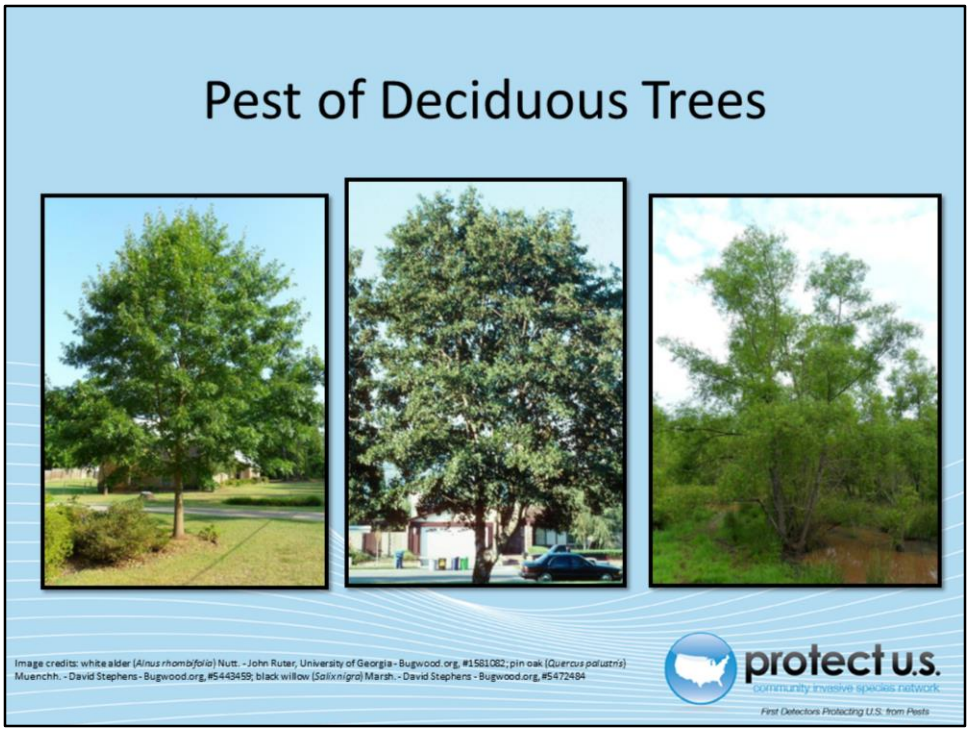
The two types of gypsy moth are the European and the Asian gypsy moths. Both are common pests in the East. The European moth is a well established pest in the West while the Asian moth is less common and a serious threat. The map above depicts the global distribution of both the Asian and European gypsy moths. The blue coloration shows the distribution in North America, while the green is the much more widespread distribution in the Eastern hemisphere.

Information sources: 1, 4, 9



The map above depicts only the distribution of the Asian gypsy moth throughout the globe. The European gypsy moth has been a pest present in the United States since the late 1800's, but it was not until recently that the Asian gypsy moth had appeared in the Western hemisphere. In 1991, the Asian gypsy moth was introduced around British Columbia, Canada and quickly spread to other parts of North America. Detection and successful eradication programs have been implemented in several states including California, Oregon, Idaho, Texas and Washington. Currently, incoming cargo from Europe and Asia is inspected thoroughly for *Lymantria dispar asiatica* before leaving the initial port and again upon its arrival at its Western destination. Due to the wide rant of acceptable hosts in North America, it is a severe risk that this pest could establish in the temperate regions of the United States and spread rapidly destroying native forests.

Information sources: 1, 4, 9

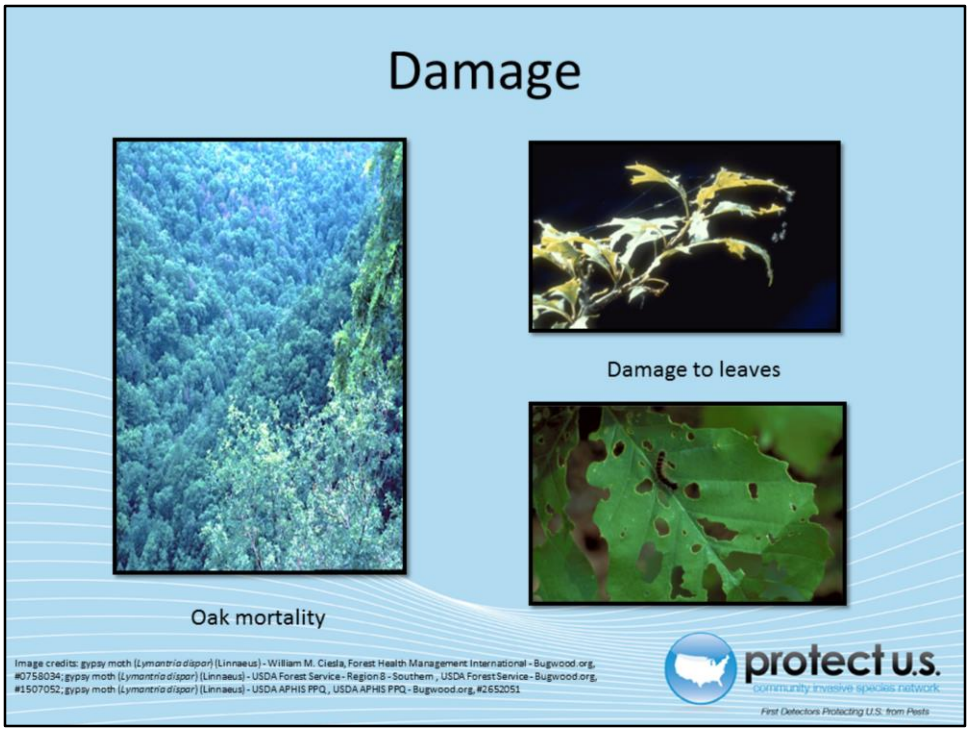


Lymantria dispar asiatica is a polyphagous pest in deciduous forests. When compared to the European gypsy moth, it has a much wider variety of hosts. The Asian gypsy moth appears to prefer larch, oak, poplar, alder, willow, and some evergreens. Younger larvae prefer oak to all other hosts. Nonetheless, they can also potentially attack other plants as well. When the population levels are high, they are more likely to move to less preferred hosts.

The main hosts include:
Alnus spp. (alder)
Larix spp. (larch)
Larix sibirica (Siberian larch)
Liquidambar spp. (sweetgum)
Malus spp. (apple)
Populus spp. (poplar)
Quercus spp. (oak)
Salix spp. (willow)
Tilia spp. (linden)
Ulmus spp. (elm)

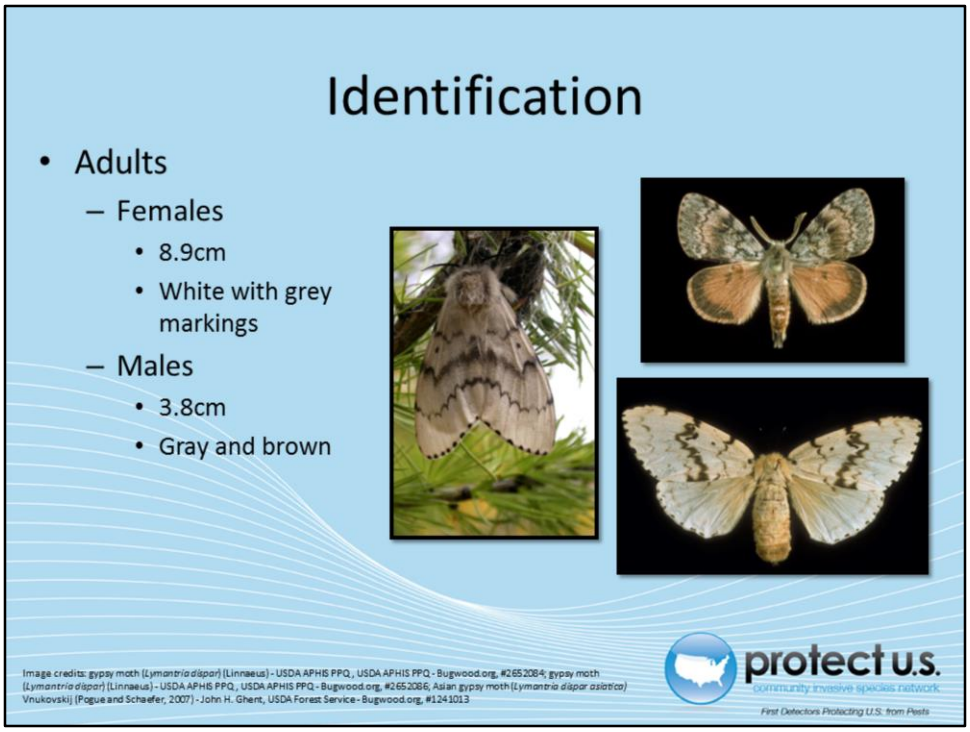
Some other potential hosts include but are not limited to the following:
Abies balsamea (balsam fir)
Acer spp. (maple)
Betula spp. (birch)
Callistemon brachyandrus (prickly bottlebrush)
Carpinus spp. (hornbeam)
Castanea spp. (chestnut)
Castanopsis spp. (chinquapin)
Celtis spp. (hackberry)
Cerasis spp.
Corylus spp. (hazel)
Corymbia maculata (spotted gum)
Cydonia spp. (quince)
Diospyros spp.
D. kaki (persimmon)
Eriobotrya spp. (loquat)
Eucalyptus spp. (gum)
Eurya spp.
Fagus spp. (beech)
Fraxinus spp. (ash)
Hammamelis spp. (witch-hazel)
Juglans spp. (walnut)
Lespedeza spp. (bush clover)
Morus spp. (mulberry)
Picea spp. (spruce)
Pinus spp. (pine)
Prunus spp. (plum)
Pyrus spp. (pear)
Rosa spp. (rose)
Rubus spp. (blackberry)
Shorea robusta (sal tree)
Wisteria spp.
Xylosma spp. (brushholly)
Zelkova spp.

Information sources: 1, 5, 9



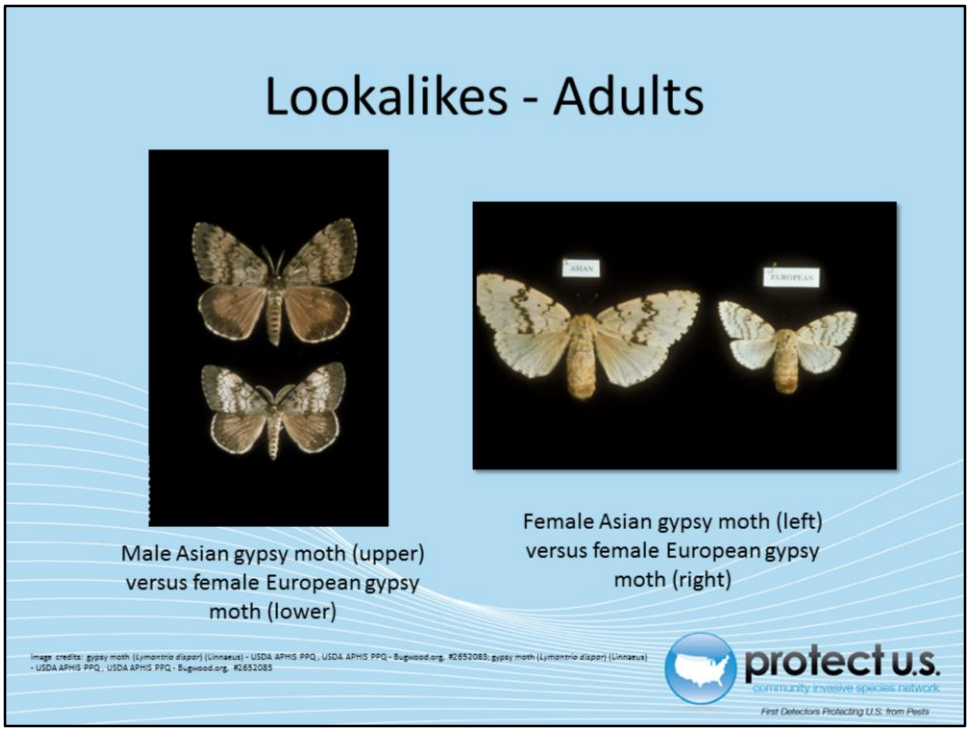
The main damage to host plants is caused by feeding larvae. Larvae can defoliate plants at a very high rate, especially when the population level is high. This defoliation also makes the plant more susceptible to secondary pests or disease. Overall, Asian gypsy moths can partially or completely defoliate forests and in the process, destroy natural landscapes and habitats.

Information Sources: 5



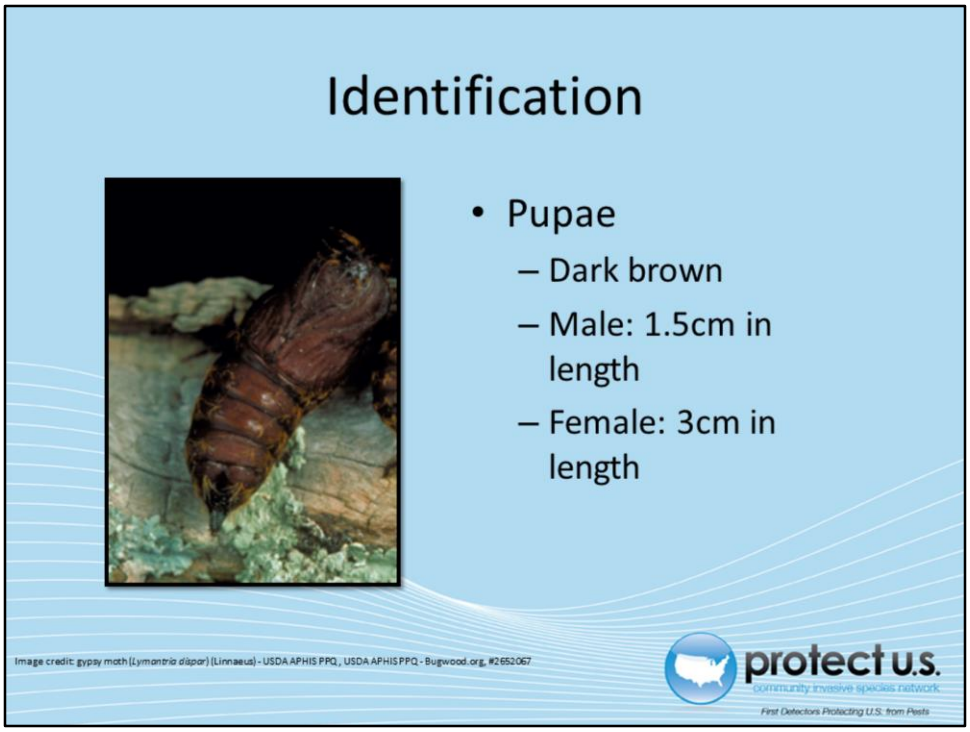
Adults, much like the pupae, will display sexual dimorphism. The males are gray and brown with a wingspan of around 3.8cm (1.5in). On the other hand, the females are much larger with a wingspan of up to 8.9cm (3.5in) and are whiter in color with gray markings. The adults are actually diurnal or active during the day unlike most moths. They will mate and both the male and female will die after eggs have been laid.

Information sources: 2, 6



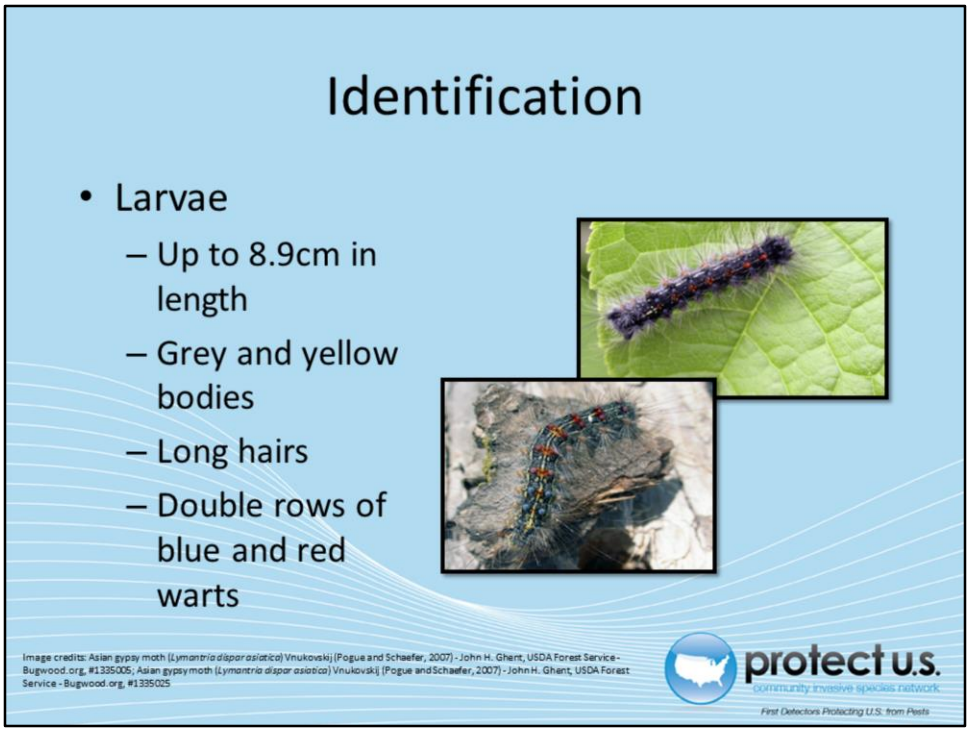
The major lookalikes of *Lymantria dispar asiatica* are other subspecies of gypsy moths. The most common one is the European gypsy moth which is already a pest in Northern America. European gypsy moths have more narrow host range and are also smaller than the average Asian moth. Another major difference is the female Asian gypsy moths can fly unlike their relatives. This is why the Asian gypsy moth is at a high risk for spreading faster and invading new areas.

Information sources: 1



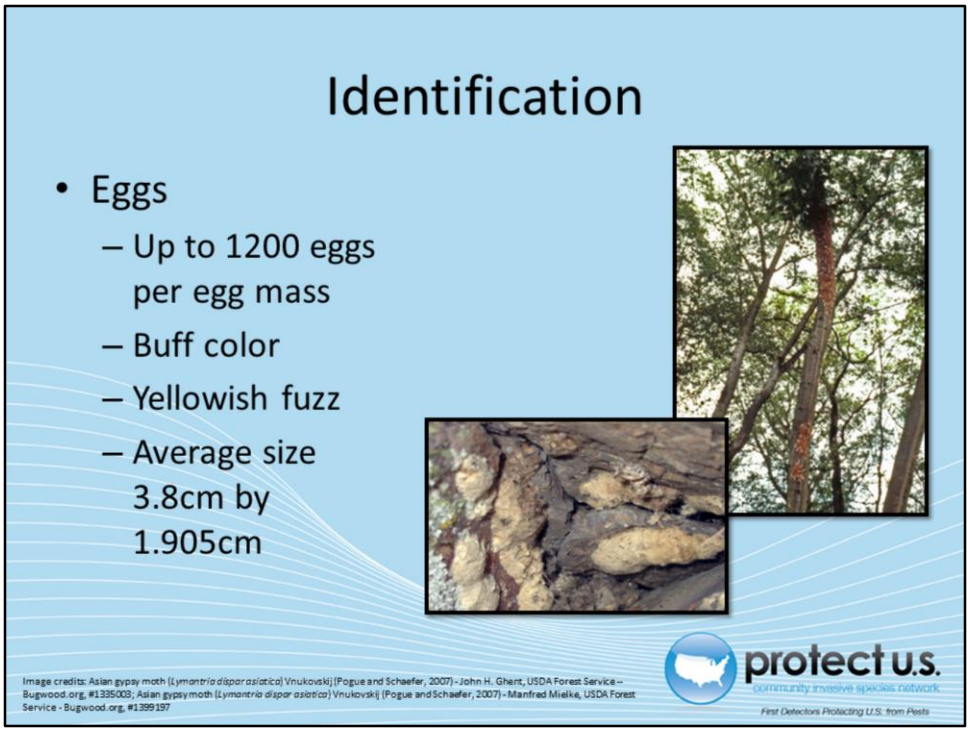
Larvae will pupate in summer around July and take 7-14 days to become adults In Europe and Asia. The pupae are dark brown and show sexual dimorphism. The male pupae are approximately 1.5cm (0.59in) while the females are about 3cm (1.18in) in length.

Information sources: 2



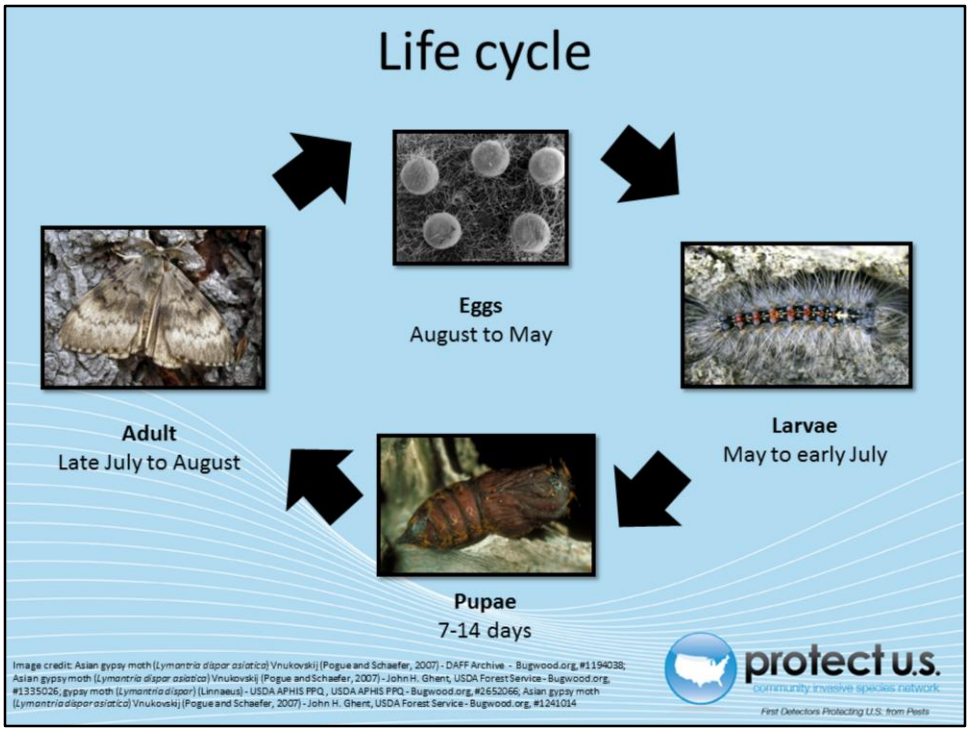
In spring, larvae will emerge from the eggs and begin feeding. Initially, the larvae are around 0.32cm (1/8in) but grow to lengths between 5.08-8.9cm (2-3.5in). The first instar will be smaller and black with long black hairs. The second instar, slightly larger, is brown with short hairs. The most distinct looking larvae are the fourth to sixth instars. They have light to dark gray bodies with some yellow flecks and long gray or gold hairs. Furthermore, they have double rows of blue and red warts. The typical pattern is five blue rows followed by six red rows but this is not always the case.

Information sources: 1, 2, 6



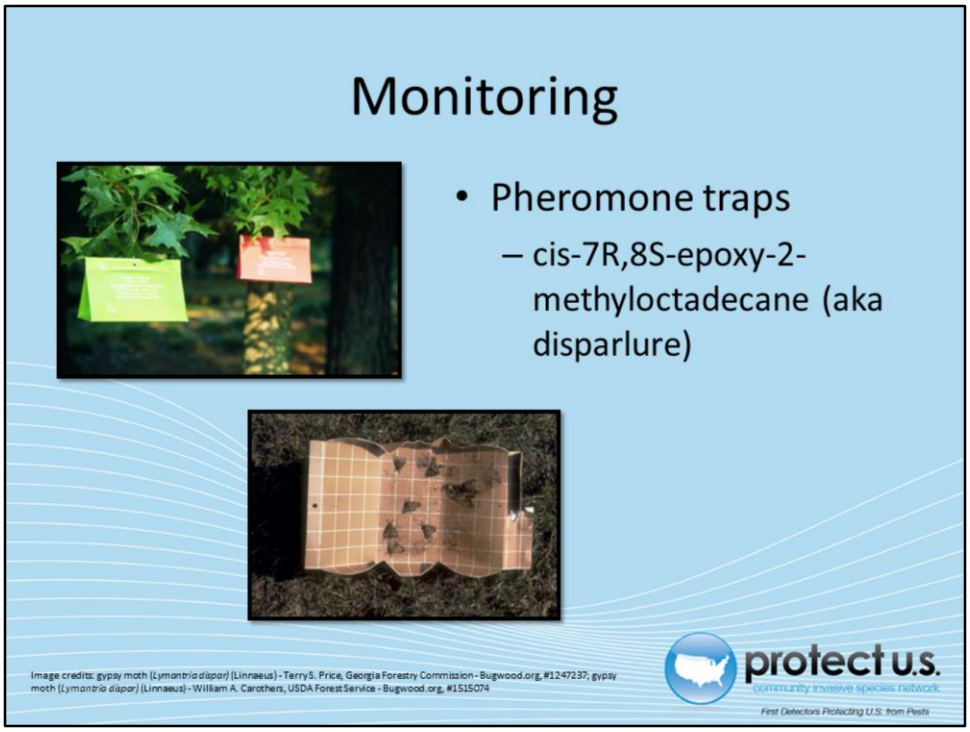
In July or August, egg masses are usually laid on directly on host trees but they can also be found on stones, walls, logs, furniture and most other outdoor objects. The egg masses are a buff color with yellowish fuzz from the female abdomen. Overtime they will lighten in color due to sun bleaching and weathering. Each egg mass can contain up to 1200 eggs and is on average 3.8cm by 1.905cm (1.5in by 0.75in) in size. Larvae develop in the egg and remain inside throughout the winter.

Information sources: 1, 5, 6



Lymantria dispar asiatica will complete one generation per year. The damaging population levels will occur about every five to seven years. In late July to August, the adult females lay eggs on a wide variety of surfaces but often the host tree itself. The adults will die shortly after the eggs are laid. The eggs will take about four weeks to develop into larvae but the larvae will remain inside the eggs over the winter. In spring, following a period of warmth, the larvae emerge from the eggs. They begin to feed on host tissues and cause damage to the hosts during this stage. Around early July, pupation will occur. The pupae will develop for about 7-14 days before emerging as adults to mate and start the next generation.

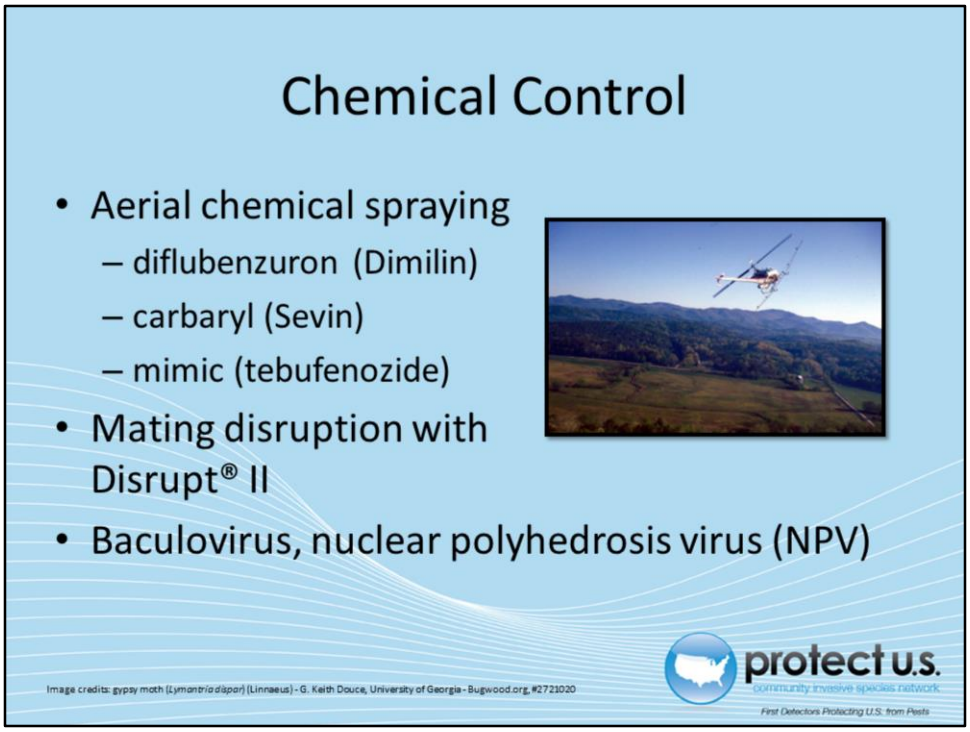
Information sources: 1



Pheromone traps can be used to monitor for the Asian gypsy moth. The recommend pheromone to use in delta, milk-carton, or tented traps is cis-7R,8S-epoxy-2-methyloctadecane which is commercially known as disparlure. These traps will attract male Asian gypsy moths This lure will also attract closely related moths including *L. umbrosa* (*Lymantria dispar hokkaidoensis/umbrosa/nesiobia*), *L. albescens* (*L. dispar albescens*), and *L. postalba* (*L. d. postalba/tsushimensis, L. albescens tsushimensis*). This monitoring system is recommended for high risk areas such as ports. Around 25 traps per square mile is suggested for extremely high risk areas and around 16 traps per square mile in areas surrounding the higher risk locations.

Light traps can also be used but they are rather ineffective and nonspecific so they are not recommended.

Information Sources: 5, 8

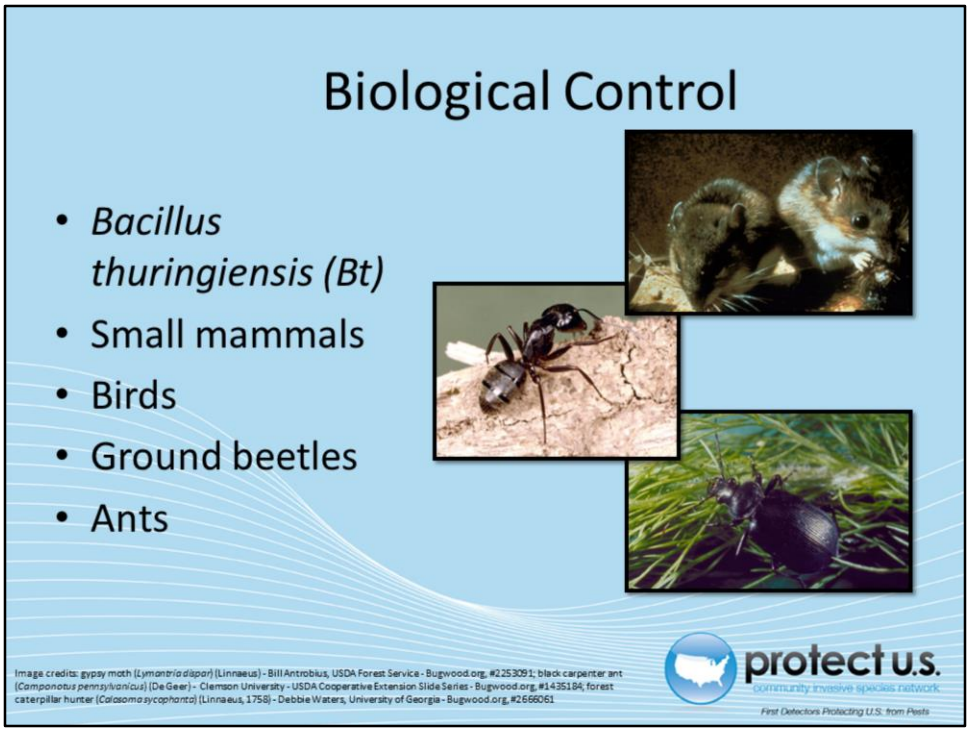


Control methods for the Asian gypsy moth have been extensively researched. In areas of dense populations, aerial spraying is a common eradication technique. The chemicals typically used against *Lymantria dispar asiatica* are diflubenzuron (Dimilin), carbaryl (Sevin), and mimic (tebufenozide). These chemicals are typically broad spectrum insecticides and can have harmful effects on other insect populations. In recent years, research for a semiochemical control has been mildly successful.

A method more specific to the Asian gypsy moth has been tested and is only available on the market as Disrupt® II plastic laminated flake formulation of sex pheromone disparlure. It is most effective at low populations levels and disrupts the mating of related gypsy moths. Currently research aims at developing a stronger synthetic pheromone to better disrupt the mating systems of the Asian gypsy moth.

Other broad spectrum sprays include Baculovirus*).* Baculovirus, nuclear polyhedrosis virus (NPV) has proven effective on low population densities of the Asian gypsy moth but as the population increase, it becomes less effective.

Information sources: 3, 10



The most common biological control for the Asian gypsy moth is *Bacillus thuringiensis (Bt).* The specific variety of *Bt* that targets all moths and butterflies is *Bacillus thuringiensis kurstaki* (B.t.k). *Bt* is a naturally occurring bacteria that interferes with larval stages as they feed. It is sprayed on foliage in spring as the larvae emerge from their eggs.

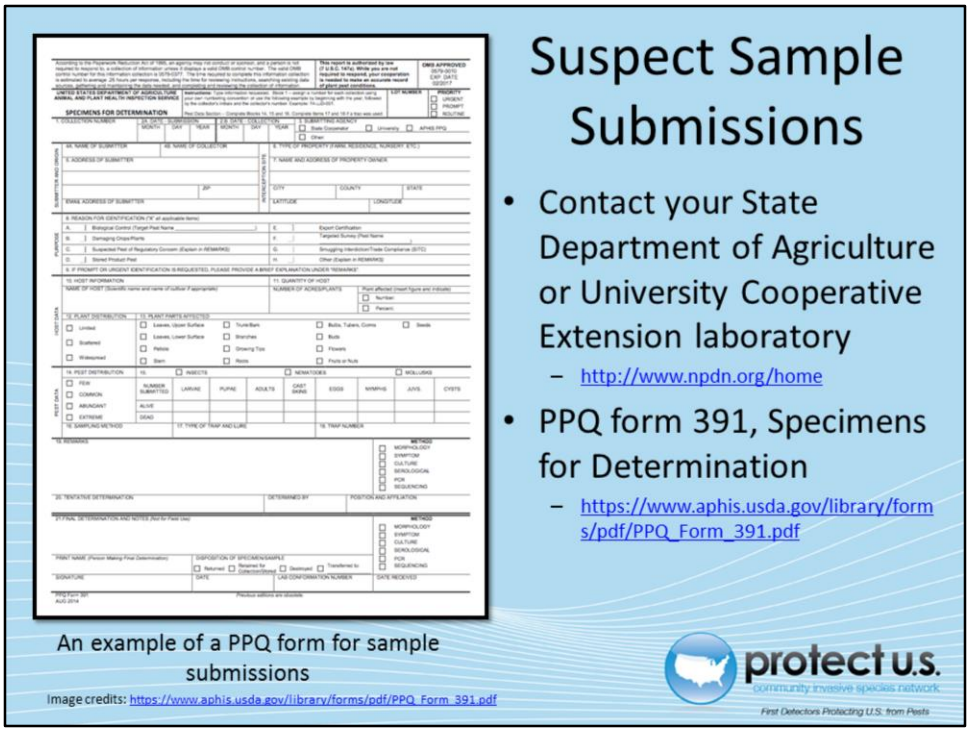
Small mammals and birds are known to feed on *Lymantria dispar asiatica* and are particularly effective when the population is at low levels but this would not naturally control an infestation.

Ants and ground beetles are some invertebrate predators of the Asian gypsy moth, but overall they are not as effective in controlling moth populations are vertebrate predators. Ants will attack early larvae and ground beetles typically target late larvae and pupae. This type of predation is most common when moth populations are very high.

Information Sources: 3, 4, 10

Cultural control methods include quick a few general techniques. One of the most important is port inspections to present future introductions of the Asian gypsy moth from spreading. Frequently, shipments to North America are checked when they leave their initially port and again upon arrival to their destination. General sanitation is also important to the control of many pests. This includes cleaning areas surrounding hosts and removing heavily infected plants. It is also important to not transport infected plant material including firewood. Siviculture is a specific type of sanitation often applied in pest eradication as a sustainable method of growth and health of forests. Recent research has looked into plant more resistant varieties of trees in order to lower population levels in heavily effected areas throughout Europe and Asia. If the moth were to invade in large numbers in North America, the same techniques could be implemented.

Information Sources: 3, 10



If a suspect pest has been located in the United States, a sample should be submitted for proper identification. Contact your local diagnostic lab to ship in a sample for identification. Information regarding your local diagnostic lab is available at National Plant Diagnostic Network (NPDN) website. The diagnostic lab information and available contacts are divided by state.

http://www.npdn.org/home

The sample specimen should be submitted along with accompanying documentation using the PPQ form 391.

https://www.aphis.usda.gov/library/forms/pdf/PPQ_Form_391.pdf

Your local diagnostic lab is part of your local cooperative extension service or your state department of agriculture. Your local lab will also have a specific form. All local labs may not be a member of NPDN. However, all labs should report new pest and pathogen detections to local regulatory officials.

Remember that new pest and pathogen records must be reported to your State Plant Health Director (SPHD) and your State Plant Regulatory Official (SPRO). The SPRO is a State Department of Agriculture Employee and the SPHD is a USDA-APHIS-PPQ employee.

The link to your SPRO is on the National Plant Board (NPB) website. It has an interactive map and when you click on your state it will take you to another page with contact information. The NPB is a cooperative organization that includes membership from all State Departments of Agriculture.

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