All you ever wanted to know about Gypsy Moths and much more...

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Division of Lands & Forests
Forest Health & Protection
Gypsy Moth (*Lymantria dispar* Linnaeus) is an exotic pest from Europe introduced in 1869 to Massachusetts. Found in hardwood forests throughout eastern North America. Range is still expanding.

Preferred forage trees

- Feed on **over 300** species of plants
- **Prefer** oaks, aspen, basswood, birch, apple, willow & hawthorn
- **Older larvae-** cottonwood, hemlock, white cedar, pines & spruce
- **Not hosts-** ash, yellow-poplar, sycamore, walnut, dogwood, balsam fir & red cedar
### Life History

- One generation per year

<table>
<thead>
<tr>
<th>Life stage</th>
<th>Length of time per individual</th>
<th>Time of year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larva (Caterpillar)</td>
<td>~ 7 weeks</td>
<td>early spring – mid-June</td>
</tr>
<tr>
<td>Pupa (Cocoon)</td>
<td>1 – 2 weeks</td>
<td>mid-June – early July</td>
</tr>
<tr>
<td>Adult (Moth)</td>
<td>~ 1 week</td>
<td>mid-July &amp; August</td>
</tr>
<tr>
<td>Egg (Egg mass)</td>
<td>~ 9 months</td>
<td>July/August - early spring</td>
</tr>
</tbody>
</table>
Larvae hatch from eggs in spring
Gypsy Moth Larvae Instars

- Larvae undergo 5 or 6 molts before adulthood
- Each instar lasts about one week
Fully grown larva
Larvae

- Hatch near bud break & feed through mid-May
- Spin a silken thread as they crawl which acts as a parachute when blown by the wind (several hundred yards to miles)
- Larvae all feature “tufts” of hairs all over body
- Larvae are almost black colored in early instars
- Later instars develop characteristic rows of red and blue spots
Feeding Damage

• Young larvae feed on tree crown foliage, remain on leaves day & night
  • damage is insignificant, often unnoticed
• Later instars feed only at night, rest in protected areas during the day
  • travel up & down tree trunks daily
  • 80% damage from final instar- eat up to 1 leaf per day!
• In dense populations – feed day & night, eat all foliage of host tree, then search for new food source

1st instar chews small holes

Older instars feed from outer edge of leaf toward the center
Pupae (Cocoon)

- Larvae pupate in mid-June, early July
- Pupate in protected areas - under tree bark, in crevices, under branches, etc.
- Dense populations - pupate anywhere
- Adults emerge 1 - 2 weeks later
Adults (Moth)

- Moths emerge in July/August
- Mate, lay eggs & die
- Females are white & do not fly
- Males are dark-buff color & fly during the day
- Female pheromones can attract males 1 mile away
- All eggs oviposited in one batch
  - Size of egg mass depends on health of female

Female covers eggs with her abdominal hairs
Eggs

- Eggs laid in late summer
- ~25 mm long for healthy egg mass
- ~600-700 eggs per egg mass
- Usually deposited in a slightly sheltered location (NOT necessarily host trees)
- Embryos develop within 4-6 weeks to fully formed pharate larvae & overwinter in this stage
Eggs can be found almost anywhere.
# New vs. Old Egg Masses

<table>
<thead>
<tr>
<th>New Egg Masses</th>
<th>Old Egg Masses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm to touch (feel hard and full)</td>
<td>Soft to touch (feel soft &amp; spongy)</td>
</tr>
<tr>
<td>Usually darker beige, buff colored</td>
<td>Usually dull or bleached coloration</td>
</tr>
<tr>
<td>Opaque to dark-colored eggs</td>
<td>Clearer eggs (no larvae inside)</td>
</tr>
<tr>
<td>No holes or small parasitoid exit holes present</td>
<td>Exit holes present</td>
</tr>
</tbody>
</table>
Early season defoliator life cycle

- **Eggs**: Overwinter in this stage
- **Larvae**: Larvae emerge in spring!
- **Pupae**: Pupate in protected area
- **Adults**: Spend less than 1 week as a moth
Outbreaks in NY

• Infestations alternate between few to many years with little defoliation followed by 2-4 years of visible defoliation
• Heavy defoliation typically lasts 2 years
• Caterpillar numbers and defoliation levels are highest during the initial infestation
• 1st occurrence 1953-57
• Prior Outbreaks: 1959, 1969, 1971-73
Effects of Defoliation

- Light defoliation (<30%) has little effect on tree health
- Moderate defoliation (31-50%) causes loss of foliage, caterpillars may be a nuisance, little mortality expected
- Heavy defoliation (>50%) may cause tree mortality to hemlock, pine and spruce. Deciduous trees can usually withstand one year of heavy defoliation.
General Effects of Defoliation

- Trees defoliated early in the season often flush a new, smaller set of leaves in July
- Repeated defoliation can result in twig & branch dieback and occasional tree mortality
- Mortality can occur when concurrent with other disturbances
  - drought
  - shallow soils
  - late season defoliation...
Additional Effects of Defoliation

- Defoliated trees often have decreased wood production and food storage.
- Stressed trees often emit pheromones that attract more pests (i.e., borers, bark beetles).
- Increases autumn sugar versus starch content in roots which may lead to *Armillaria* root rot.
Natural Control Factors

- Low spring temperatures
- Adverse weather conditions
- Starvation of larva
- Disease/Pathogens
  - Nuclear Polyhedrosis Virus (NPV)
  - *Entomophaga* fungus
- Insects, birds & mammals
Management/Control Options

• Option for large areas with expected heavy defoliation or repeat defoliation
  – Aerial spraying of *Bacillus thurengiensis (B.t.)* during mid-May to early June depending on weather conditions & time of hatch

• Options for small areas or individual trees
  – Place burlap on trees & destroy larvae that rest underneath
  – Place sticky barriers on trees to prevent larvae from crawling up tree trunk
  – Remove egg masses before they hatch
  – Remove larvae when congregated
  – Maintain tree health
  – Apply NPV (Gypcheck) or *B.t.* to weakened trees