2024 Spongy Moth Update: What to know & What you can do

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1

Wisconsin Draws Battle Plans to Repel Gypsy Moth Invaders

THE MILWAUKEE JOURNAL. Sunday, May 19, 1963

Gypsy moth caterpillar

THE GARDENER'S Question Box

2

Spongy Moth (*Lymantria dispar*)

- Formerly known as the *Gypsy Moth*
- Invasive; native to Europe and northern Asia
  - Introduced in New England in late 1860's
  - Range expanding west/south; outbreaks @ leading edge
- Caterpillars feeds on a wide range of trees and shrubs

Spongy moth caterpillar

Adult (female) spongy moth w/egg mass

3

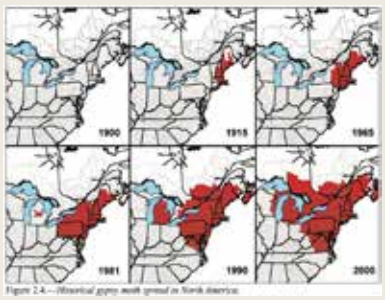
Spongy Moth History & Spread

E. L. Trouvelot

- Brought to US in 1869 in attempt to breed a hardy silkworm hybrid
- Accidentally escaped his home lab!

4

Spongy Moth History & Spread

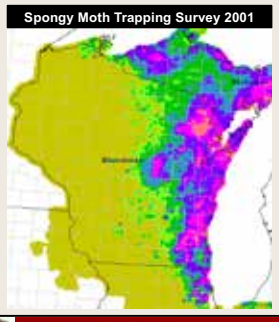


Status of Spongy Moth (2000)

5

Recent Trends in Wisconsin

Spongy Moth Trapping Survey 2001



Spongy Moth Trapping Survey 2022

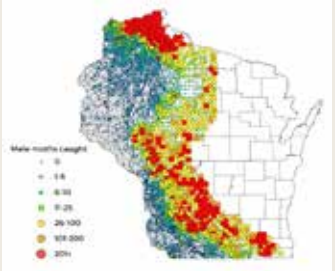


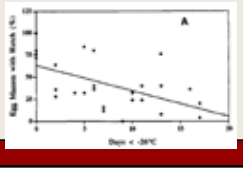
Chart & Map Source: WI-DATCP

6

Spongy Moth Trends: 2020 – 2023+

- Populations have been on the rise for several years in Wisconsin
- Dry spring weather plays an important role
- **Fungal disease** (*Entomophaga maimaiga*) causes high mortality if rainy
- Other factors such as heavy snow cover and mild winter temperatures can also increase survival of eggs

USFS: winter egg mortality
48-72 hours at -20˚F (-28˚C)



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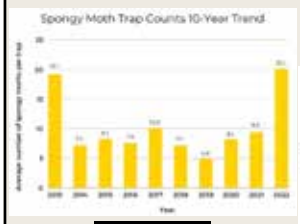
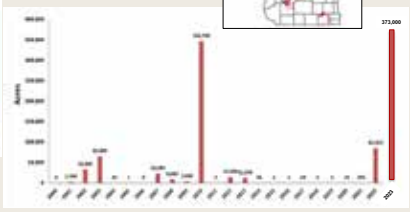
Spongy Moth Trends in Wisconsin

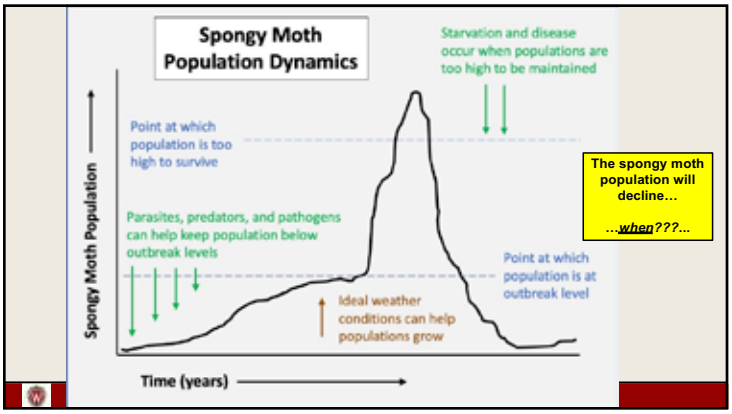


Credit: WI-DATCP



Acres Defoliated by Spongy Moth 2000 – 2023
Credit: WI-DNR

8



9

Why is the spongy moth such a problem?

- Really invasive! — all life stages (esp. eggs) can easily be transported by humans
- Major defoliator of hardwood trees in forested and landscape settings
- Dynamic populations — optimal conditions can lead to outbreaks & significant defoliation

Egg masses on underside of truck

Dozens of egg masses on tree

10

Spongy Moth Host Plants

- Known to feed on over 300 plant species
- Mostly hardwoods, but some conifers can be attacked

Favorite foods	Acceptable meals	Unlikely to be fed on
oak	maple	
aspen	walnut	arborvitae
willow	chestnut	green, white, and black ash
apple and crabapple	hickory	balsam fir
tamarack	cherry	locust
white birch	hemlock	scotch pine
witch hazel	elm	red cedar
mountain ash	hackberry	tulip poplar
basswood	black and yellow birch	catalpa
linden	beech	sycamore
pine (older caterpillars)	cottonwood	dogwood
spruce (older caterpillars)	box elder	
	ironwood	

Large-scale defoliation due to spongy moth

11

Spongy Moth Caterpillars

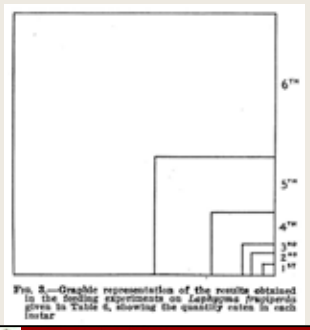
- Larvae (caterpillars) are the damaging life stage
  - Use chewing mouthparts to feed on foliage
- Pass through 5-6 larval sub-stages (instars)
  - Small caterpillars (1st & 2nd instar):
    - Dark w/pale spots; "shaggy" w/raised bumps
    - Active day & night
    - Can disperse via ballooning
  - Large caterpillars (3rd + instar)
    - Up to ~2" long
    - Grayish w/raised blue and red nodules
    - Active at night
    - Most feeding damage caused by last two instars!

Early instar spongy moth caterpillar

Late instar spongy moth caterpillar

12

Leaf Consumption by Caterpillars



- Later instars consume much more leaf area than younger larvae
- For spongy moth, 80-90% of feeding damage is caused by final two instars!
- This can give the impression of a sudden or overnight appearance of caterpillars

13

Spongy Moth Pupae

- Brownish pod-like structures w/golden hairs
- Can be 1.5+ inches long
- Inactive during this stage
- Remain in pupal stage for ~ 2 weeks
- Present in late June – early August


Spongy Moth Pupae

14

Spongy Moth Adults & Eggs

- Adults (moths) ~1.5" long
  - ♀ Whitish, thin antennae, flightless
  - ♂ Brownish, "bushy" antennae
- Males must fly to females to mate
- Adults short-lived
- Egg masses: fuzzy and beige
  - Contain 500-1000 eggs


Spongy Moth Egg Mass

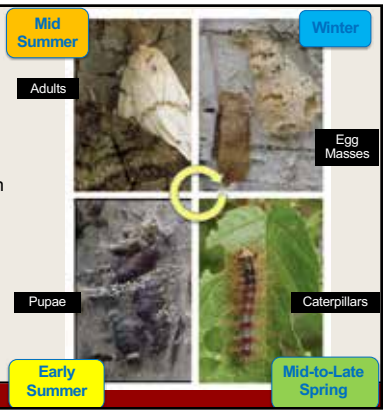

Adult Female

Adult Male

15

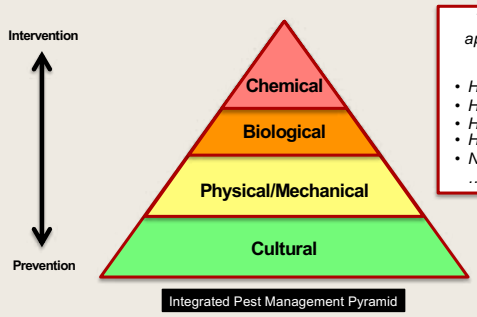
Spongy Moth Life Cycle

- One generation per year
- Overwinter as egg masses
- Caterpillars emerge in spring; reach maturity in early summer
- Pupate in late June or July
- Adults present July onwards



16

Management Approaches for Spongy Moth



Integrated Pest Management Pyramid

Tailor these management approaches for your specific situation!

- *How large of an area?*
- *How many trees affected?*
- *How large are the affected trees?*
- *How much time do you have?*
- *Non-chemical preference?*
- *…*

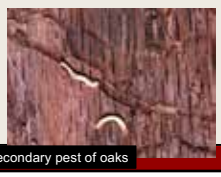
Each management approach has strengths, weaknesses, and limitation

Awareness of this is important!

17

Cultural Approaches:

- Manipulation of the local environment to prevent pest problems or reduce the amount of damage; *planning & decision making*
- Regulatory control (quarantines, laws, etc.)
- Sanitation (elimination of hiding spots)
- Proper plant care (proper mulching/watering/tree-care, minimize stress, etc.)
- Tolerance of damage (context important!)



Two lined chestnut borer—a secondary pest of oaks

18

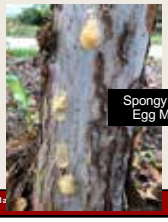
Physical (Mechanical) Approaches:

- Physical activities performed to help prevent or reduce pests
  - Scraping away egg masses
  - Crushing caterpillars/pupae/adults*
  - Traps: sticky band, burlap, pheromone

19

Physical Removal of Egg Masses

- Each egg mass contains 500-1,000 eggs
- Eggs are non-mobile & present for 8+ months
- Can be physically scraped away (don't leave on ground)
- Egg masses can be on trees, homes, firewood, vehicles...



Understand the caveats & limitations!

Timing?

...consider the parasitoid wasps

20

Keep Safety in Mind!

Egg mass scraping efforts

21

Crushing Caterpillars, Pupae, and/or Adults

- Spongy moths can be killed by crushing, *with caveats*
  1. Caterpillars are covered in urticating hairs
     - Use tool, stick, etc. or wear protective gloves (leather, etc.)
  2. Pupae
  3. Adult ♀ possess potent and long-lasting pheromone…
     - Consider disposable gloves (nitrile, latex, vinyl)

22

Trapping of Caterpillars: Sticky Band

- Young caterpillars need to reach tree canopy to feed
- A sticky band trap can intercept small caterpillars as they climb upwards in early/mid spring
- **Procedure:**
  1. Cover trunk with duct tape or cling wrap
  2. Spread sticky material (Tanglefoot, Vaseline, etc.) on tape/wrap
  3. Can suspend mesh netting, chicken wire, etc. above to deter vertebrates

Understand the caveats & limitations!

Photos courtesy of Andrea Diss-Torrance, WI-DNR

23

Trapping of Caterpillars: Burlap Band

- Larger caterpillars active at night; hide during the day
- Burlap bands provide a hiding spot to concentrate in small area
- **Procedure:**
  1. Tie strip of burlap around trunk with twine, string, etc.
  2. Check daily and knock caterpillars into container of soapy water to maximize effectiveness

Understand the caveats & limitations!

Photos courtesy of Andrea Diss-Torrance, WI-DNR

24

Pheromone Traps

- Useful for *large-scale monitoring*; assessing year-to-year trends
  - Help inform overall state-level efforts & Slow the Spread Program
- Do not control spongy moth populations; *not for use in individual yards*

"Delta" trap

"Milk-carton" trap

Understand the caveats & limitations!

25

Biological Control:

- Use of natural enemies (beneficials) to reduce pest levels

1. **Predators**: ground beetles & other insects, mice, birds
2. **Parasites**: stingless wasps & flies
3. **Pathogens**: entomopathogenic fungus and virus

Parasite: Stingless Encyrtid wasps

Predator: "Fiery searcher" Ground Beetle

Predator: Mice

26

An ace in the hole?...*Entomophaga maimaiga*

- Fungus from native range of spongy moths
- Purposefully introduced in 1910-11 & 1985-86—*deemed unsuccessful!*
- 1989 infected spongy moth caterpillars found
- Can kill caterpillars in a matter of days; additional spores produced
- Weather plays a key role…*moisture/humidity is critical!*

Overwintering fungal spores

27

Life cycle of *Entomophaga maimaiga*

Hope for a wet spring!...

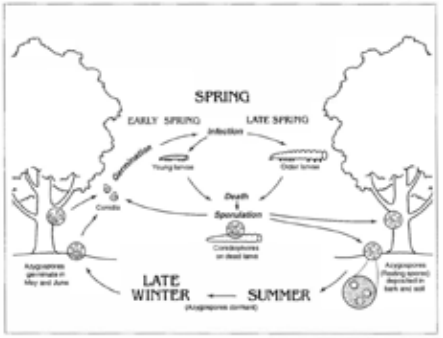
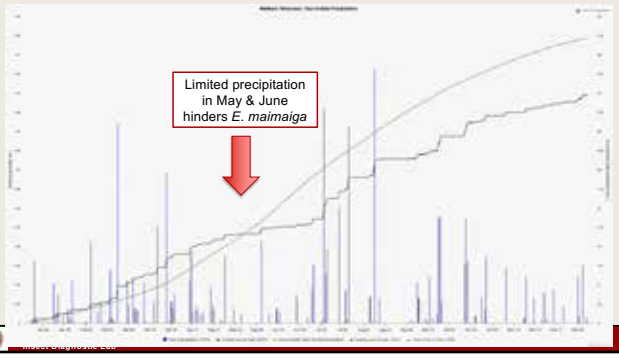


*Figure 3. Continuous life stages of **Entomophaga maimaiga** depicting germination, infection, death, and sporulation. Both germ conidia (from azygospores) and conidia (discharged from cadavers) are labeled as "conidia" above to simplify this complex life cycle.*

28

Madison Precipitation: 2023

Chart Source: WI State Climatology Office



29

Chemical Control

- Use of insecticides to reduce pest levels
  - This can include **lower-risk (biorational)** & **conventional** pesticides
  - Life stages to target: eggs or caterpillars

Understand the caveats & limitations!

Each pesticide is different:
- Pest(s) it works against
- How long they last
- Impacts on beneficials…
- Etc.

Disclaimer:
- Always follow all label directions
- Ingredients & products shown ≠ endorsement

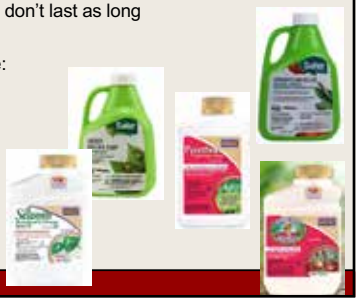
30

Lower-Risk Pesticide for Caterpillars: Foliar & Contact Sprays

- Generally derived from natural sources; many have Organic labeling
- Often less-toxic than synthetic products & don't last as long

- Common options for spongy moth include:
  - Insecticidal soaps & oils
  - Pyrethrins
  - Azadirachtin
  - Spinosad
  - *Bacillus thuringiensis kurstaki* (Btk)
    - *Btk is used for aerial spraying efforts*
    - Most effective against small caterpillars!

Work by contact only



31

Conventional Pesticides: Foliar Sprays

- Synthetically produced, *but may be based on naturally-occurring compounds*
- Often more potent and longer-lasting than biorational products
- Generally broad spectrum (can affect a wide range of insects)

- Common products contain pyrethroid ingredients
  - Ingredients end in "-thrin"
  - *Ex. Bifenthrin, cyfluthrin, cypermethrin, cyhalothrin, deltamethrin, permethrin, etc.*
- Tree care professionals have additional options
- Important to consider tree size (height)!

Understand the caveats & limitations!

32

Conventional Pesticides: Systemic Treatments

- Synthetically produced, tend to be long-lasting
- Some options available to public; most restricted to professional use only
  - Ingredients include: acephate, clothianidin, dinotefuran, emamectin benzoate…
  - Application methods include: soil drench/injection, trunk injection, trunk spray

Important Considerations:

- Large trees cannot be effectively treated by homeowners (dosage)
- Need to factor in length of time required for uptake!
- Consider caterpillar size too!

33

Chemical Treatment of Egg Masses:

- Egg masses can be treated with dormant horticultural oils
- Ideal treatment conditions: temperatures are consistently just above 32˚F
- Eggs present for ~9 months—*long window of opportunity*

Important Considerations:

- Very few products list spongy (gypsy) moth egg masses
- Most products **only** allow for very dilute applications (1-2%) and don't work well
- Golden Pest Spray Oil (Stoller) allows for 50% dilution; highly effective
  - *Unfortunately, expensive and hard to find…*

34

Parting Advice:

- Consider your individual situation and plan ahead
- Search for egg masses on your property
- Physically remove egg masses or treat (when appropriate)
  - If wanting to treat…try to find appropriate products sooner rather than later…
- Be familiar with SM life cycle—know when to watch for caterpillars
  - Don't get caught off guard by late-instar caterpillars
- Consider consulting an arborist sooner rather than later, if needed
- *Hope for a rainy spring!*

35

Additional Information:

- **UW-Madison Division of Extension Spongy Moth website**: fyi.extension.wisc.edu/spongymothinwisconsin/
  - Spongy moth 2-page factsheet
  - Month-by-month management guide
  - Host plant preference list
  - Links to additional resources

Spongy Moth in Wisconsin
Division of Extension

36