

# LEAF-FEEDING INSECT PESTS OF WOODY PLANTS

*IDENTIFICATION, BIOLOGY,  
AND MANAGEMENT*



Photo by David J. Lambert  
RHS.org

# Introduction

- ★ Pest Identification
- ★ Pest significance
- ★ Pest Biology
- ★ Pest Management





# Leaf-Feeing Insect Pests

- ★ “Webs and Tent-Makers”
- ★ Consumers
- ★ Skeletonizers



# Leaf-Feeding Insect Pests

- ★ Leafminers



- ★ Notchers



# Eastern Tent Caterpillar

- ★ Preferred hosts:

- Crabapple
- Peach
- Plum
- Cherry

- ★ Overwinters as egg mass

- ★ **Appears in early spring**





# Eastern Tent Caterpillar

- ★ **Tents form in main branch crotches**
- ★ One generation/year
- ★ Completely defoliation may result



# Pest Management

- ★ **Prune** out tents early
- ★ Chemical insecticides



# Fall Webworm

- ★ **Form webs on branch tips**
- ★ Broad host range
- ★ **Common in late summer**





# Fall Webworm

- ★ One generation/year
- ★ Larvae are hairy and straw colored



# Pest Management

- ✦ Prune out **webs**
- ✦ Chemical insecticides



Laura Jesse  
ISU Extension  
August 2006

# Mimosa Webworm

- ★ Host specific on honeylocust



- ★ Two generations/year
- ★ Overwinters as pupa





# Mimosa Webworm

- ★ Webs the leaflets together
- ★ Complete tree defoliation may result



# Gypsy Moth

- ★ Entered the U.S. in late 1860's from Europe
- ★ Major defoliator of **forest and shade trees**
- ★ **Preferred host is oak**
- ★ Overwinters as egg mass



# Gypsy Moth Life Cycle





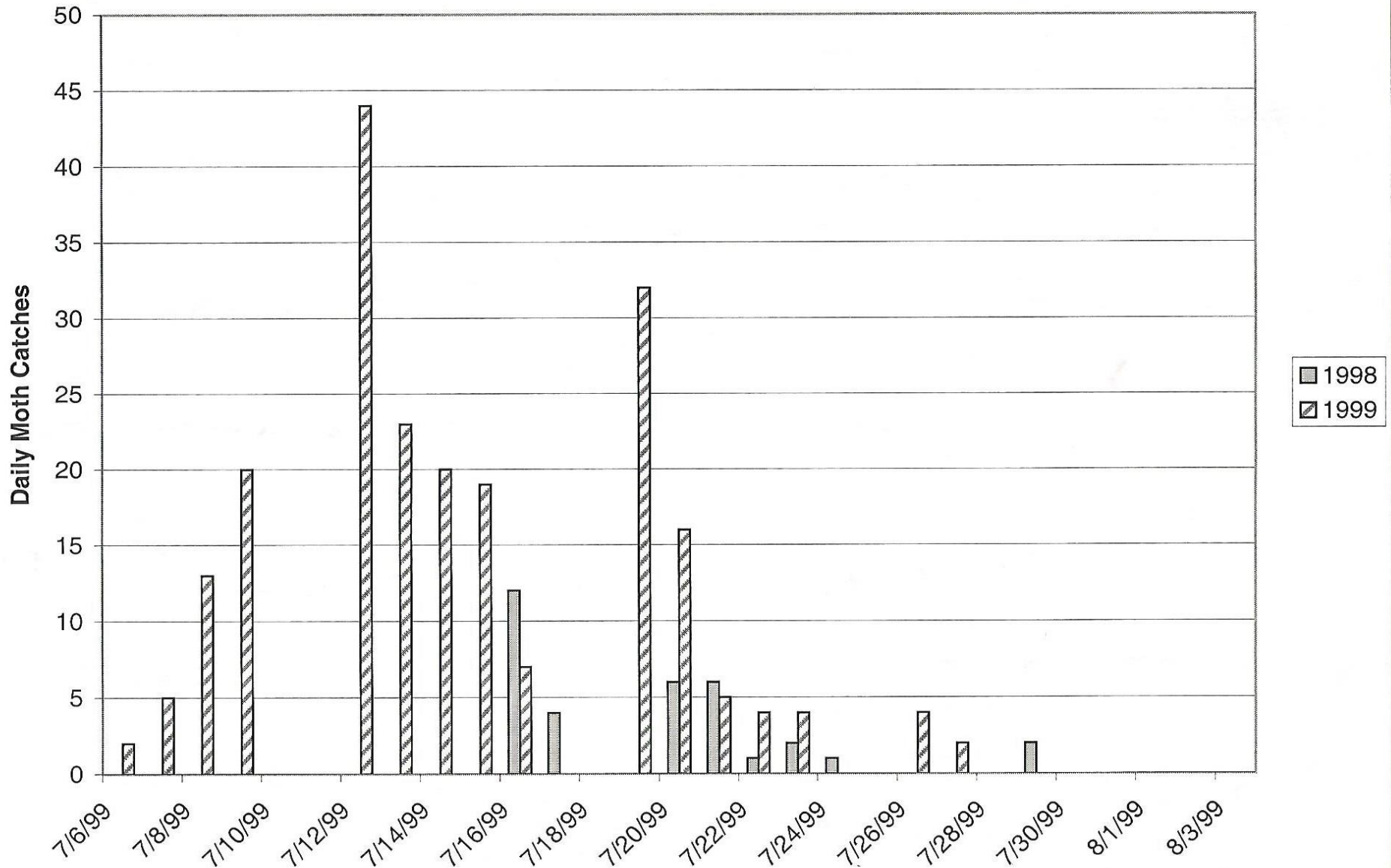
# Gypsy Moth Larvae

- ★ Larvae are hairy
- ★ Have 6 pairs of **red dots** and 4 pairs **blue** dots on back



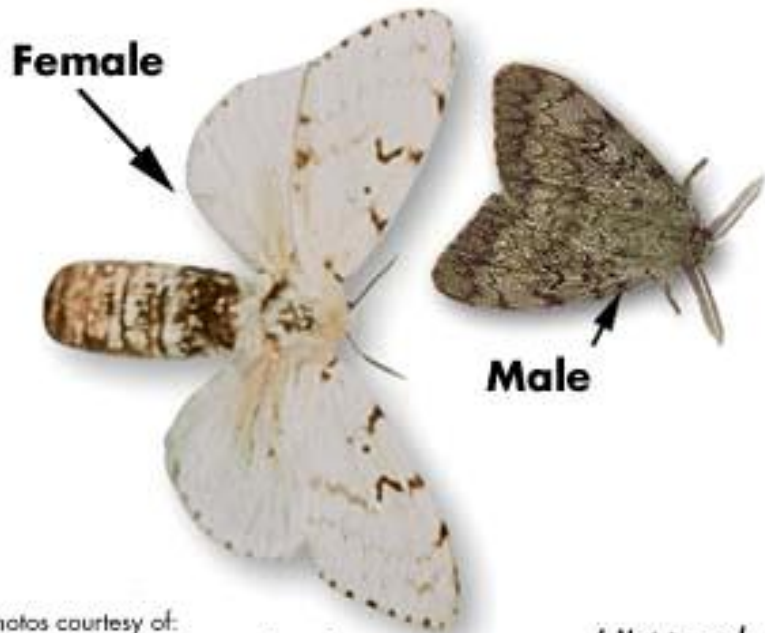
Photo by: Cooperative Extension University of California

**Adult Male Gypsy Moth Catches  
The Morton Arboretum  
1998 - 1999**



# Gypsy Moth Adults

- ★ One generation per year



Photos courtesy of:  
**Canadian Food Inspection Agency**

*( Not to scale )*





# Gypsy Moth

- ★ Populations are somewhat regulated by cultural and biological controls
- ★ Chemical sprays are used during **outbreaks**

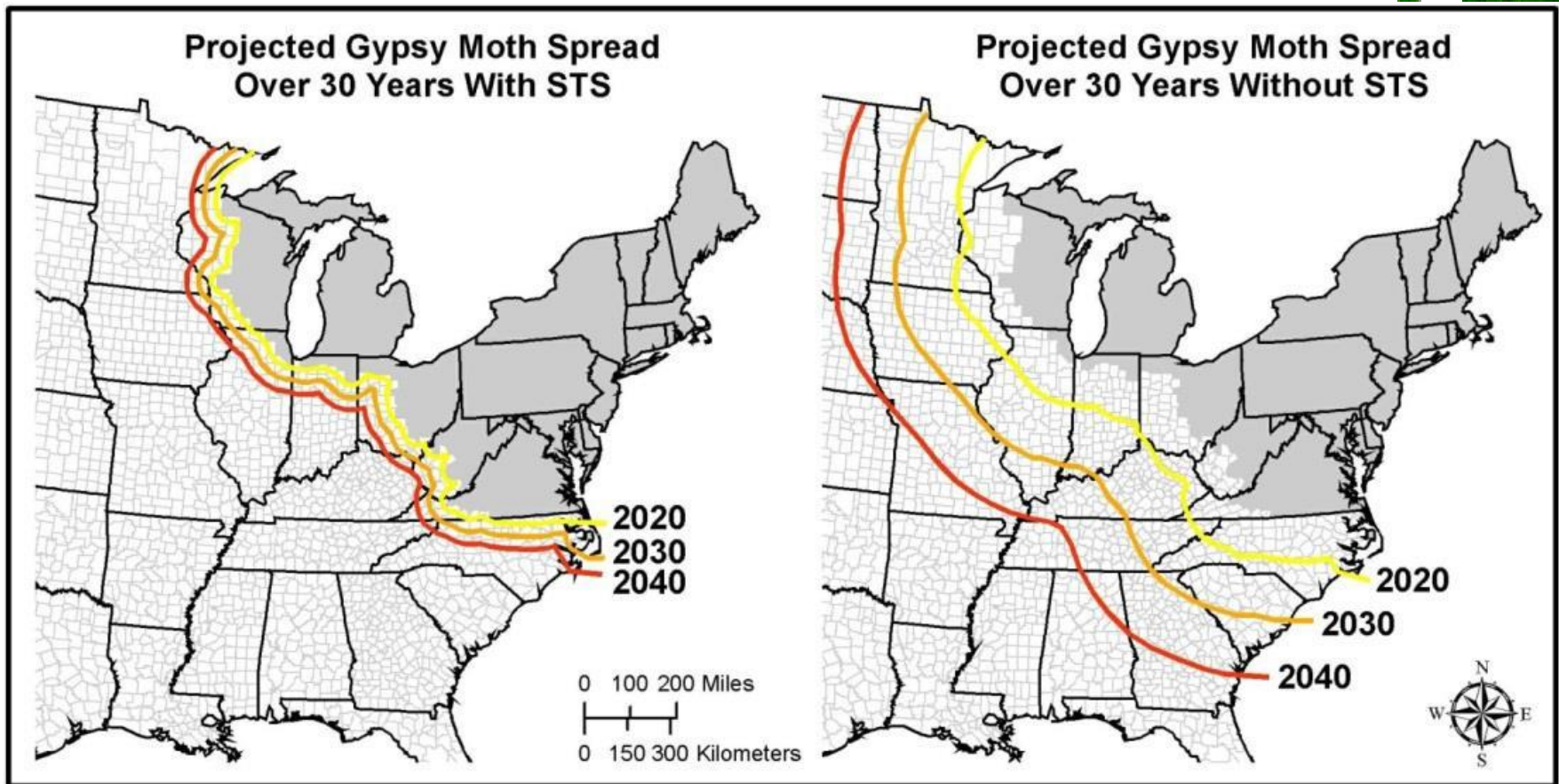




# “Early Slow the Spread Program”

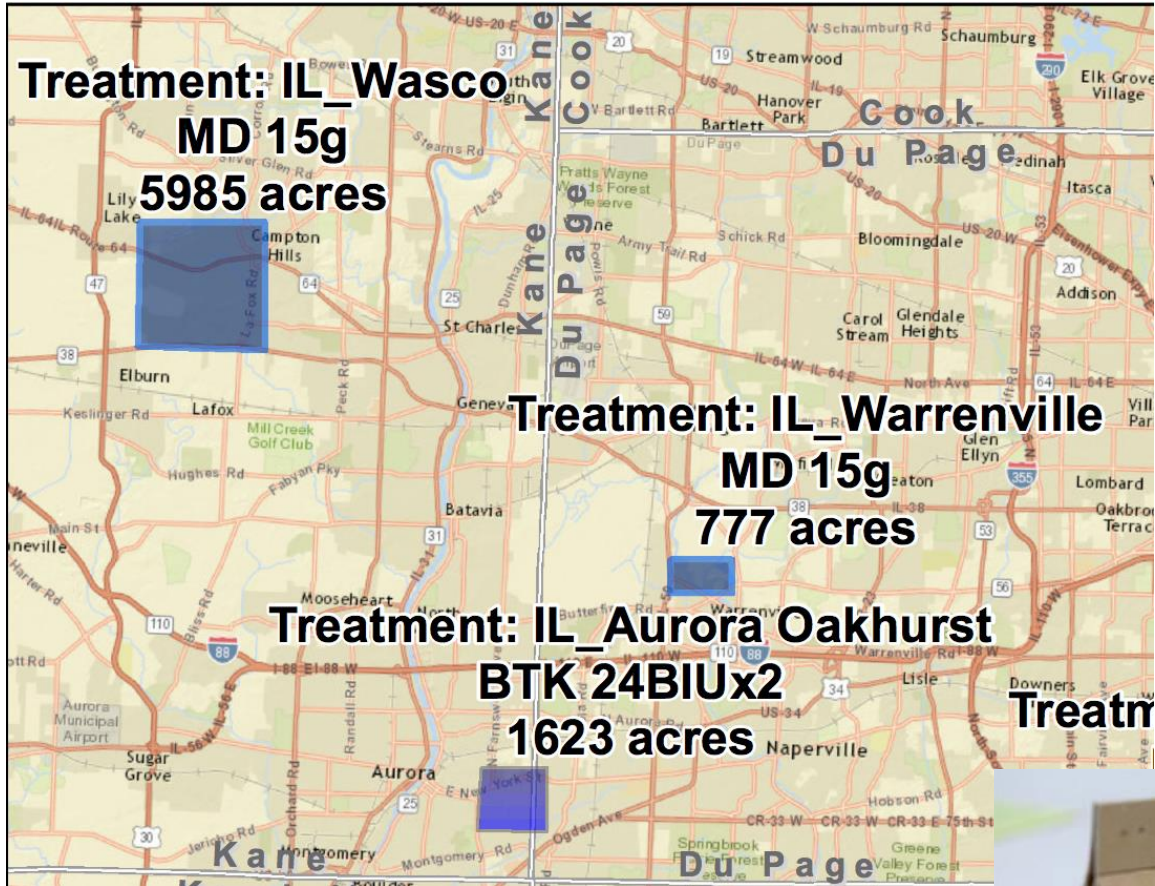


# Slow the Spread Program





# Gypsy Moth in Illinois



# European Pine Sawfly

- ★ Preferred hosts are Scots and mugho pines

- ★ **Larvae resemble caterpillars**





# European Pine Sawfly

- ★ Consume the entire needle
- ★ **Eat last year's growth**





# Feeding Damage

- ★ One generation/year
- ★ Severe defoliation is possible



# Pest Management

- ★ Remove larvae by **hand-picking**
- ★ **Chemical treatment** is most effective



# Leaf Beetles

- ★ Both larvae and adults feed on leaves
- ★ Adults **chew holes** in the leaves
- ★ Larvae “**windowpane**” the leaves





# Leaf Beetles

- ★ Hosts include willow, poplar, viburnum, and elm
- ★ Multiple generations per year



# Leaf Beetles

- ★ Overwinter as adults in protected sites
- ★ Heavily defoliated trees will appear **scorched**



# Pest Management

- ★ Host plant resistance
- ★ Chemical insecticides
- ★ **Trunk banding**
- ★ Biological control



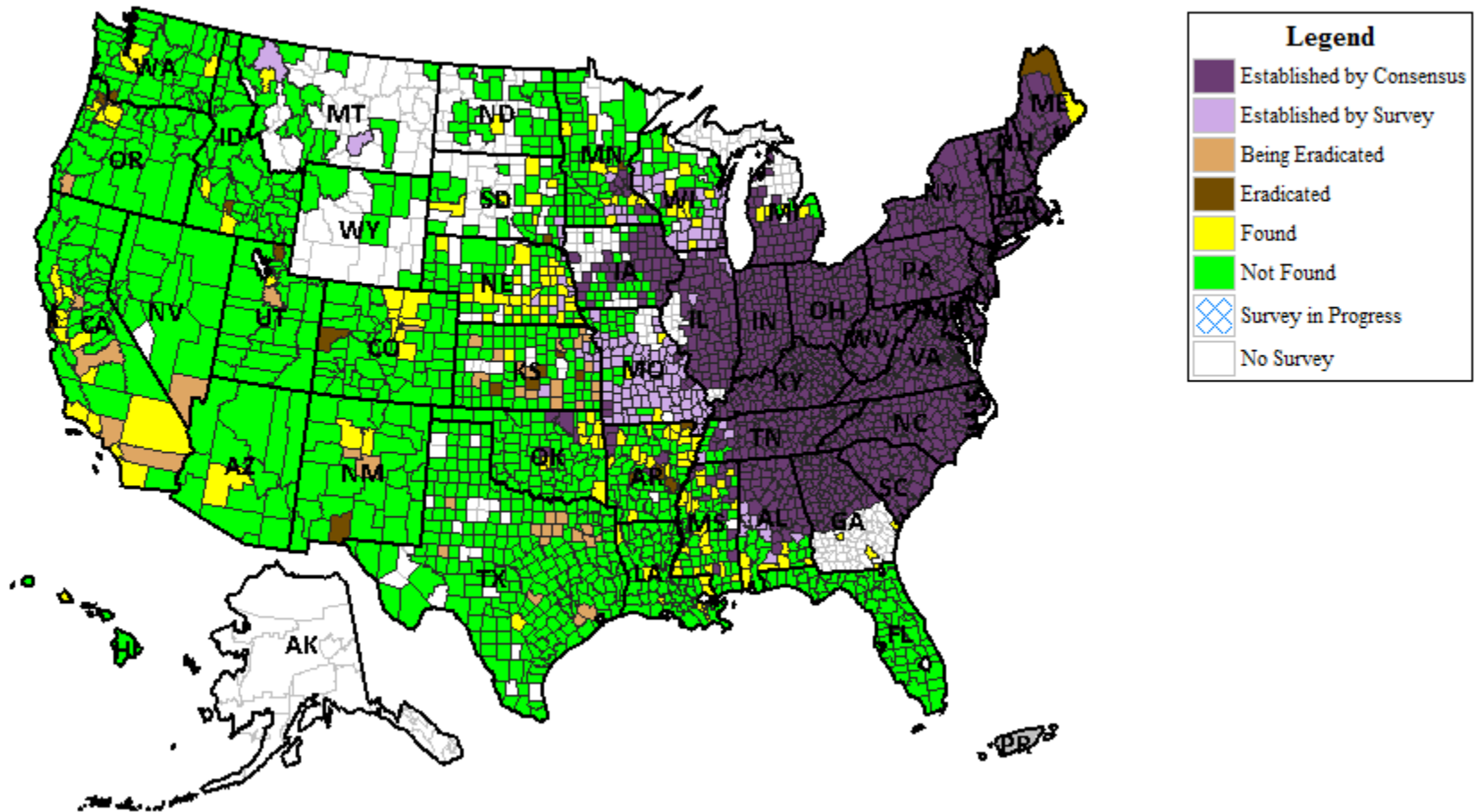


# Japanese Beetle

- ★ Broad host range
- ★ Prefers hosts are Rose family, lindens, elms, and grape
- ★ Adults **skeletonize** the leaves



## Survey Status of Japanese Beetle - *Popillia japonica* All years



# Japanese Beetles

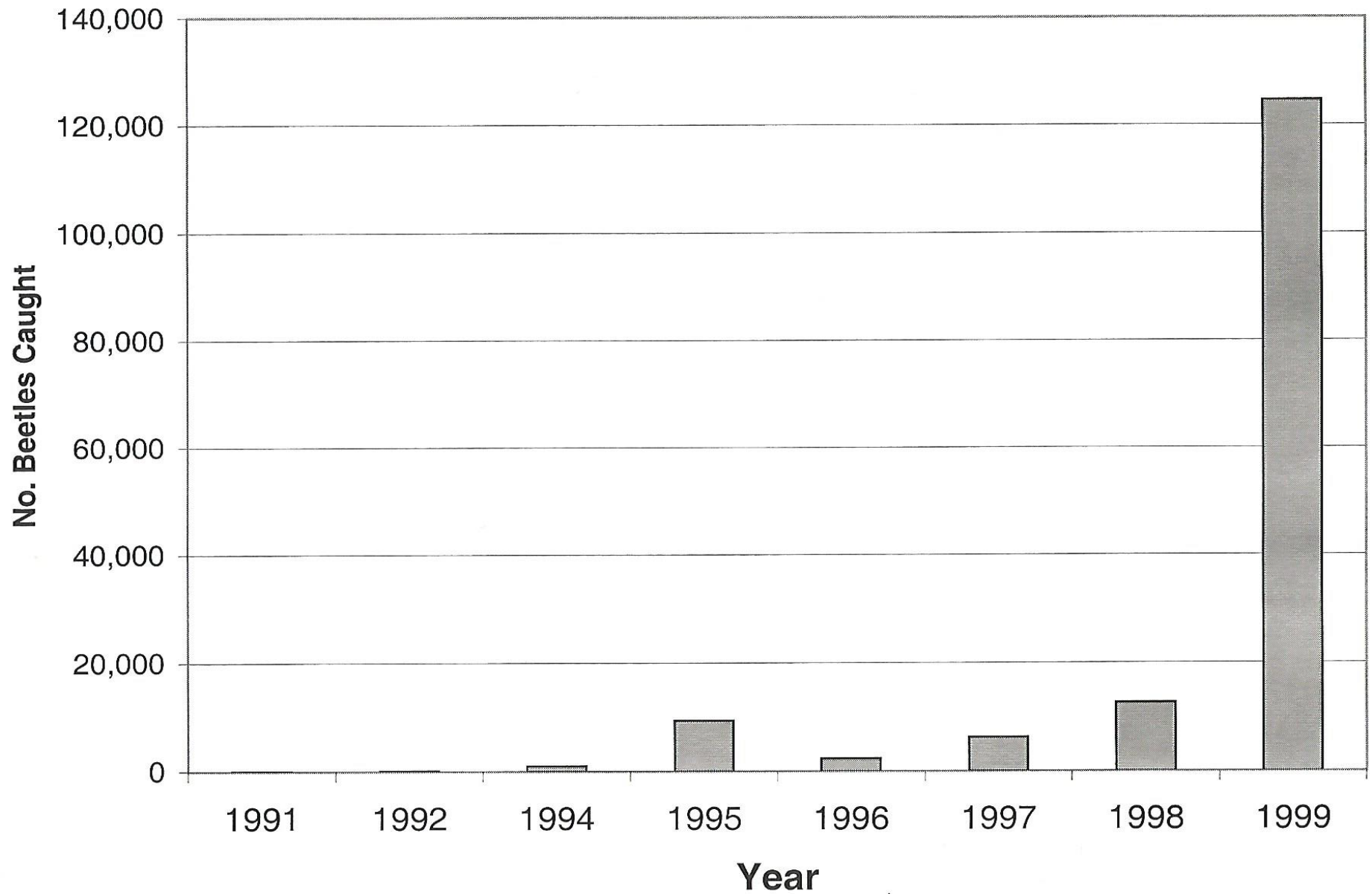
## The Chicago Botanic Garden

### 1995 - 1999

<b>Year</b>	<b>Date First Beetles Caught</b>	<b>Degree Days</b>	<b>Date of Peak Catch</b>	<b>Degree Days</b>
<b>1995</b>	3-Jul	984	17-Jul	1375
<b>1996</b>	8-Jul	819	9-Aug	1474
<b>1997</b>	9-Jul	822	23-Jul	1162
<b>1998</b>	19-Jun	749	24-Jul	1605
<b>1999</b>	21-Jun	763	21-Jul	1479.5



**Adult Japanese Beetle Catches  
The Chicago Botanic Garden  
1991 - 1999**



# Feeding Damage



# Japanese Beetle

- ★ Overwinters as a **grub**
- ★
- ★ Grub feeds on turf roots
- ★ One generation/year
- ★ Adults active for 6-8 weeks





# Pest Management

## ★ Host plant resistance

- Leaf chemistry and morphology may play a role

## ★ Chemical insecticides

- Conventional insecticides
- Bio-rational insecticides



# Pest Management

- ★ **Hand-picking** (Switzer and Cumming, 2014)
  - Most effective for small-scale management
  - Most effective in evening
  - Reduces positive feedback between existing and future beetles
  - Female with heavy egg loads more likely to initiate aggregation
  - Males and females with lower egg loads join existing aggregations
- ★ **Biological Control** (Behle and Goett, 2016)
  - Fungus *Metarhizium brunneum* was found to be effective against beetles grubs and adult beetles



# Less Preferred Hosts

- ★ *Acer negundo*
- ★ *Acer rubrum*
- ★ *Acer saccharinum*
- ★ *Carya ovata*
- ★ *Euonymus* spp.
- ★ *Fraxinus americana*
- ★ *Fraxinus pennsylvanica*
- ★ *Ilex* spp.
- ★ *Juglans cinerea*
- ★ *Liriodendron tuliperfera*
- ★ *Magnolia* spp.





# Less Preferred Hosts

- ★ *Morus rubra*
- ★ *Populus alba*
- ★ *Pyrus communis*
- ★ *Quercus alba*
- ★ *Quercus rubra*
- ★ *Quercus velutina*
- ★ *Rhododendron* spp.
- ★ *Syringa vulgaris*
- ★ *Abies* spp.
- ★ *Taxus* spp.
- ★ *Pinus* spp.
- ★ *Picea* spp.



# Preferred Hosts

- ★ *Acer palmatum*
- ★ *Acer platanoides*
- ★ *Betula populifolia*
- ★ *Hibiscus syriacus*
- ★ *Juglans nigra*
- ★ *Malus* spp.
- ★ *Platanus acerifolia*
- ★ *Populus nigra*



# Preferred Hosts

- ★ *Rosa* spp.
- ★ *Sassafras albidum*
- ★ *Sorbus americana*
- ★ *Tilia americana*
- ★ *Ulmus americana*
- ★ *Ulmus procera*
- ★ *Vitis* spp.





# Japanese Beetle Traps



# Leafminers

- ★ Usually host specific
- ★ Larvae **mine** the areas between the upper and lower leaf surfaces
- ★ Mines appear as **blotch** or **serpentine**
- ★ Usually causes **aesthetic** damage



# Leafminers

- ★ May have one or two generations/year
- ★ Usually overwinter as larvae or **prepupae**
- ★ Chemical management is the most effective treatment





# Leafminers on Oak, Elm, and Arborvitae



# “Notchers”

## \* Black vine weevil

- Adults **notch** leaf margins
- **Adults feed at night**
- **Adults not able to fly**
- Reproduces **parthenogenetically**
  - \* No males in the population





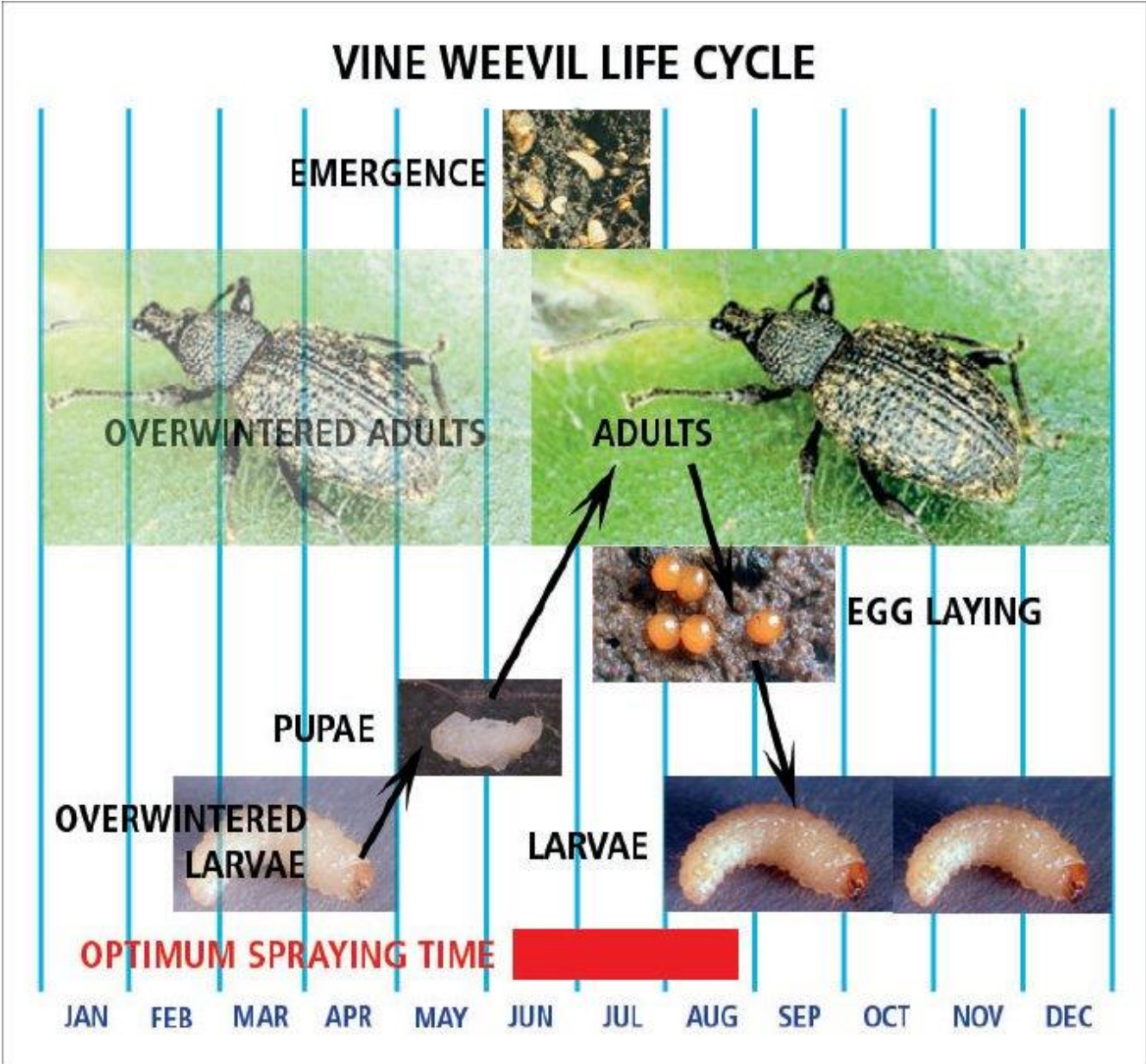
# “Notchers”

- ★ **Black vine weevil**
  - **Larvae feed on roots**
  - One generation per year





# Black Vine Weevil Lifecycle



# Management of BVW

- ★ Chemical insecticides

- ★ Sanitation



- ★ Larvae controlled using **entomopathogenic nematodes (EPNs)**

- *Steinernema feltiae*
- *Heterorhabditis bacteriophora*

- ★ Study with EPNs on strawberries showed that EPNs controlled BVW for up to 4 years

- ★ Portable listening devices used for insect detection in containers



# “Notchers”

## ★ Leaf-cutter bees

- Harmless, no control needed
- Cut **U-shaped notches** in leaf margins
  - ★ 1/4-1/2 in.
- Use leaf portions for nesting





# SUMMARY

- ★ Leaf-feeding insects rarely kill plants
- ★ **Defoliation of evergreens can be lethal**
- ★ Healthy plants can tolerate low to moderate defoliation



# SUMMARY

- ★ **Repeated heavy defoliation events may lead to:**
  - **Stress, Decline, and Death**
- ★ Chemical management can be effective
- ★ **Plant Health Care (PHC)** should be an integral part of the management plan



# END OF PRESENTATION

