

# Beetle Mania: Deep dive on Japanese beetles

Matthew Beziat

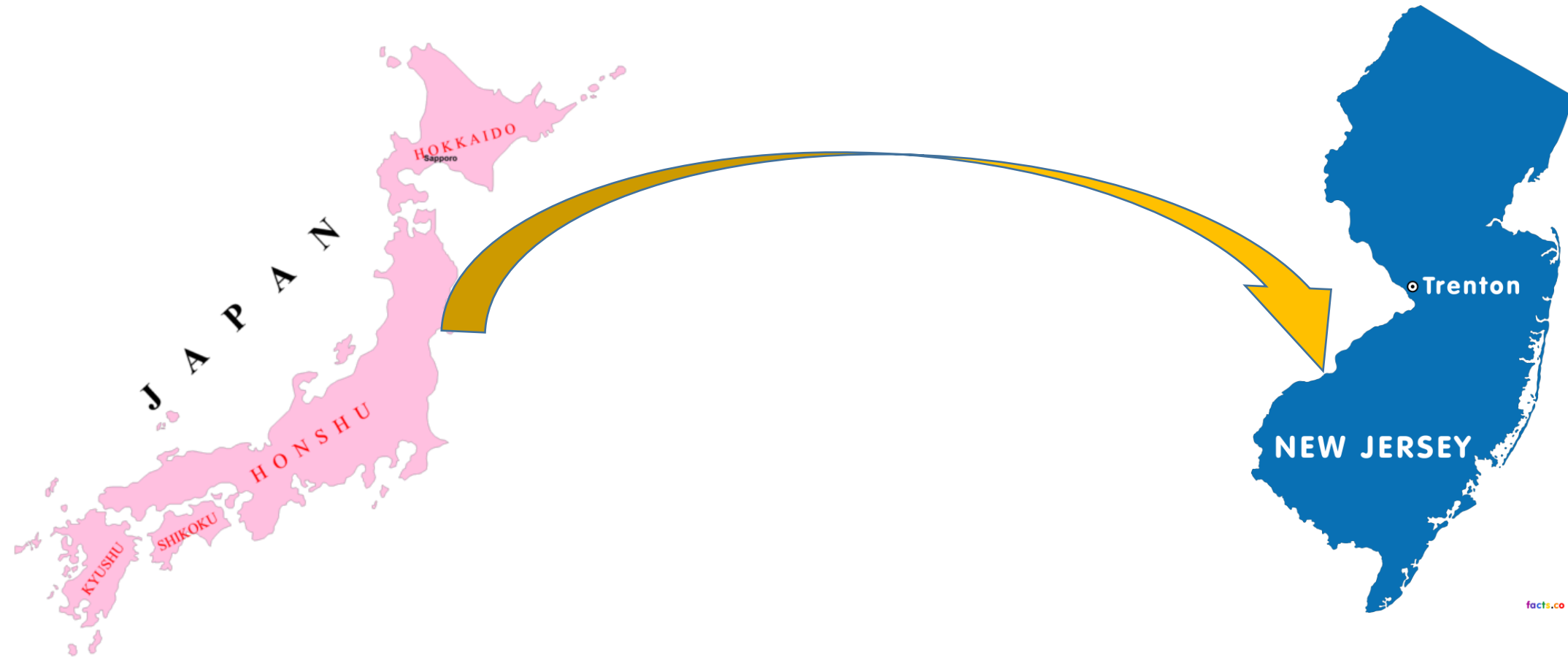


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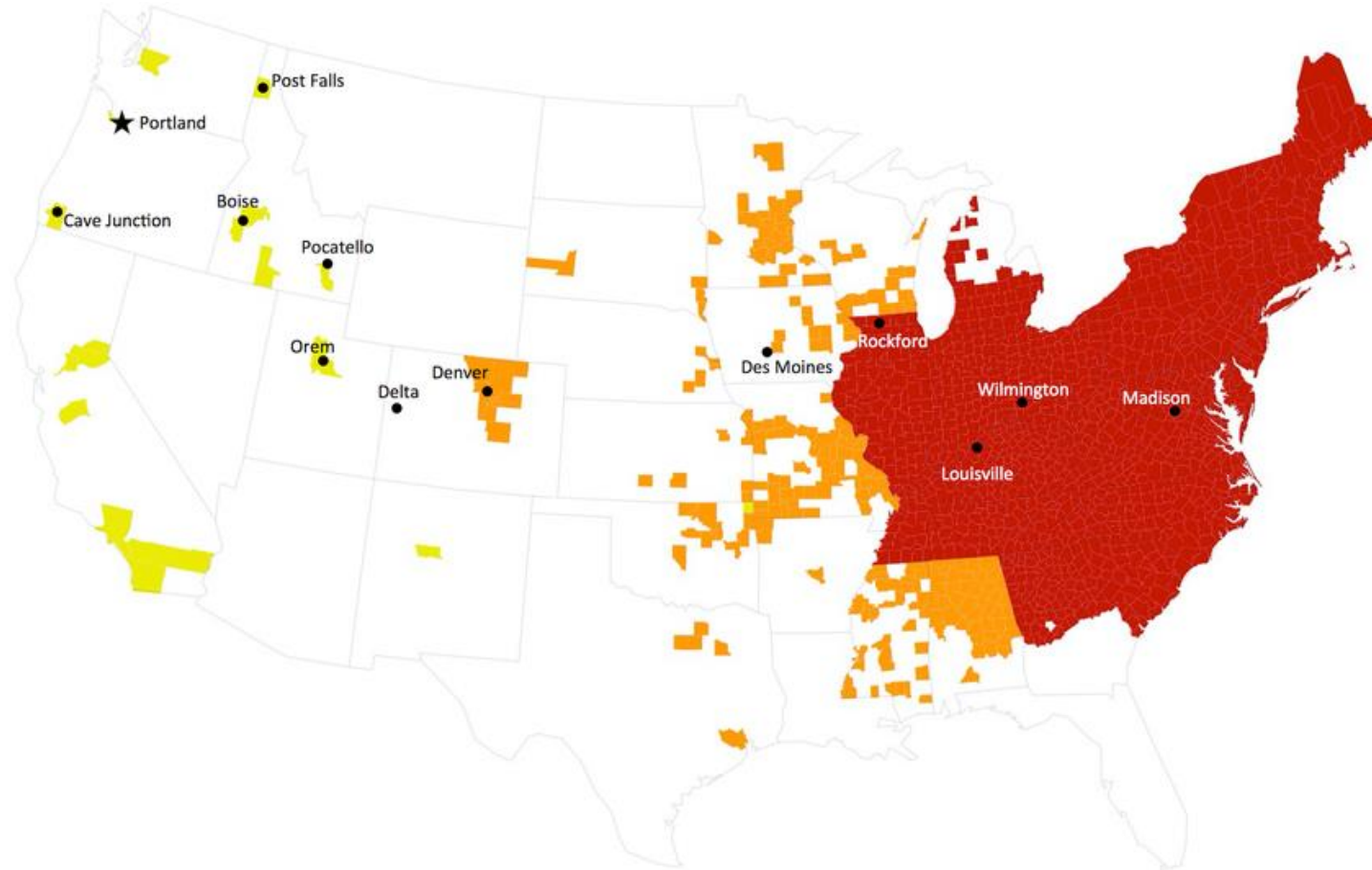
# Prior to 1916, the Japanese beetle was known only on the main islands of Japan



In 1916, about a dozen beetles were collected at a nursery outside of Riverton, NJ- may have been imported as grubs as early as 1911



# Japanese beetle is established in 28 states and continues to spread westward with detections in 13 additional states



Some of the movement has been natural spread, others have been mediated by humans

**JB Identification: About .5 inch long, bright metallic green head and copper elytra**



Also have distinct white tufts of hair on abdomen edge



# There are JB lookalikes out there such as the false Japanese beetle



Not as brightly colored, lack distinct white tufts of hair

# Dogbane leaf beetles are brightly colored and metallic as well



Antennae are the incorrect shape and no hair tufts



# Green June beetle is often found at the scene of the crime with Japanese beetles



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An inch or longer with green and gold coloration, can be a minor pest

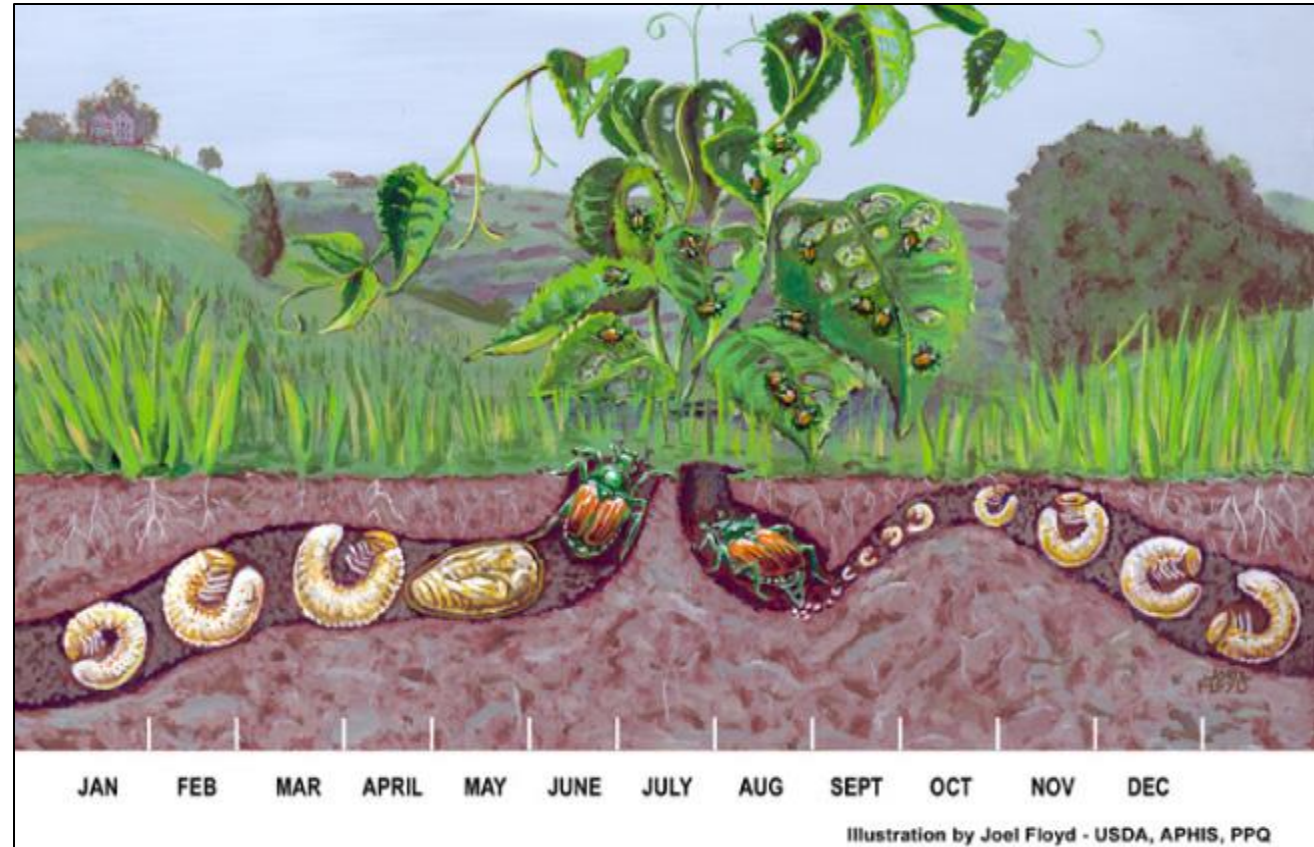
# Multicolored Asian lady beetles are often confused with JB due to their names



Not plant pests but do become fall home invaders



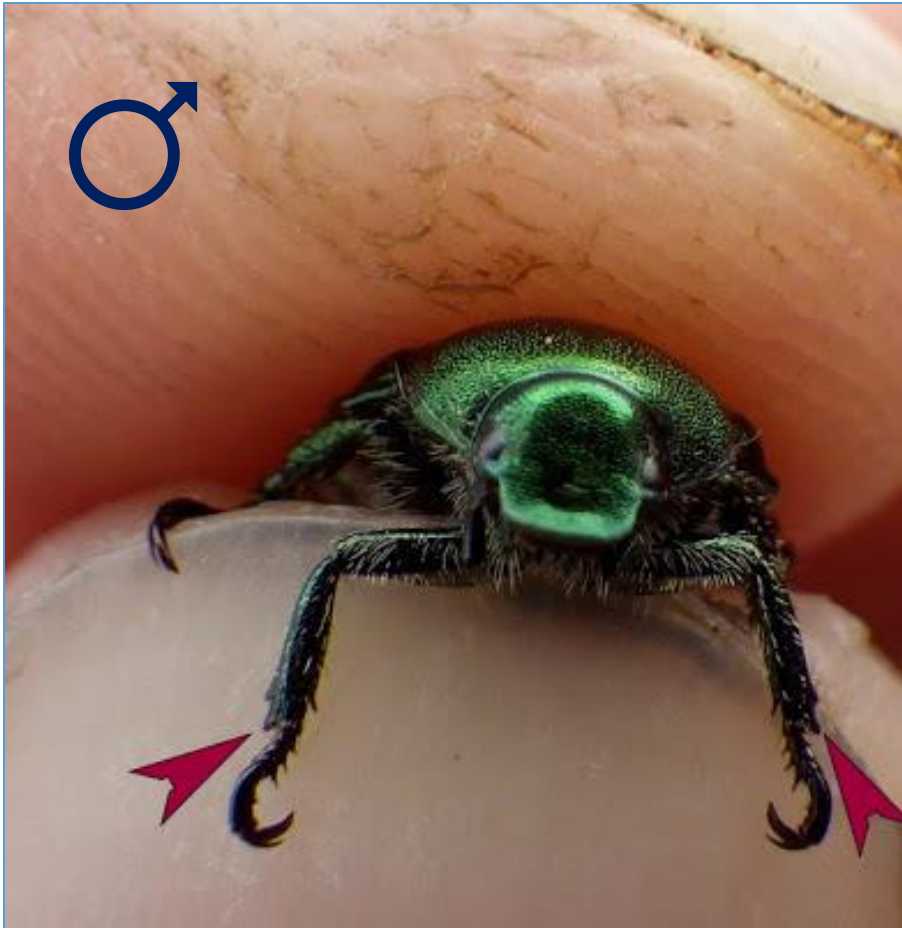
# Japanese beetle life history: have one generation per year (aka univoltine)



Emergence times vary based on location, the South is earliest  
New England last



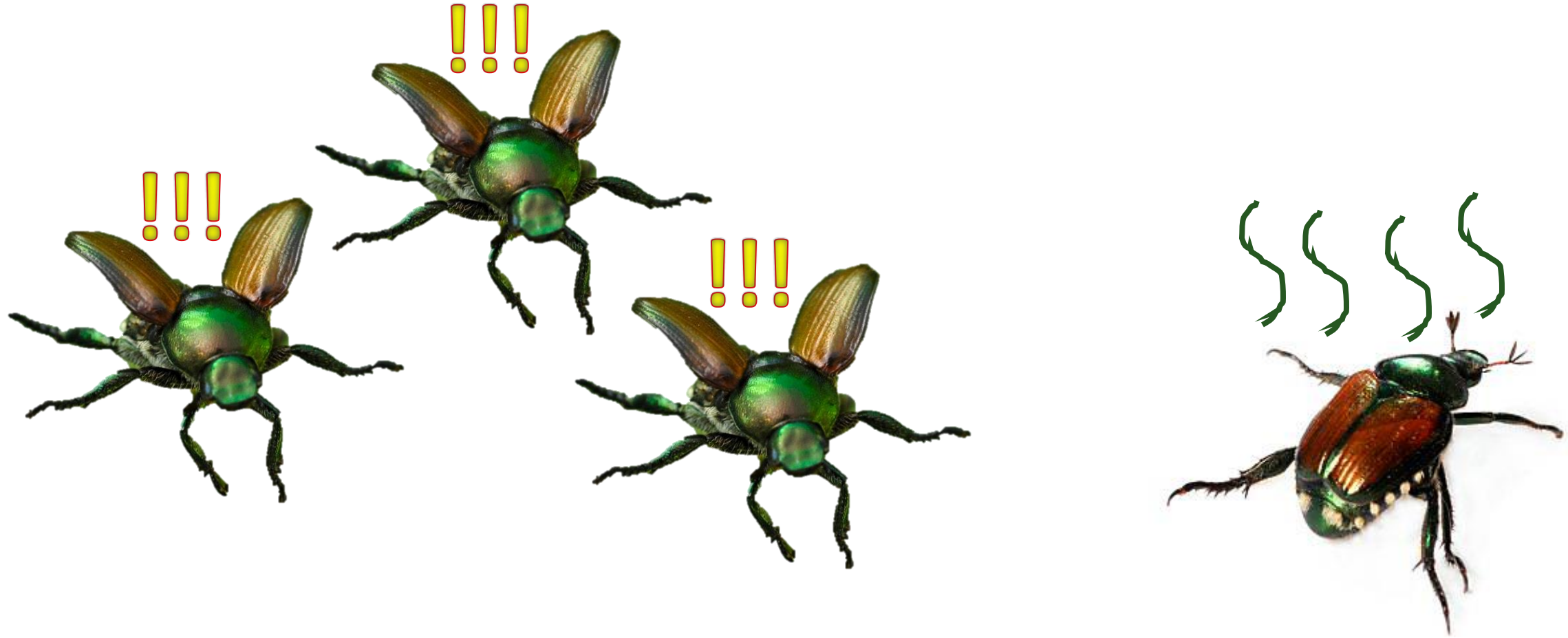
# Males emerge from soil before females do



Males have sharp claws on their feet while females have spoons on their feet (for digging into the soil)



**New females are mated with immediately upon emergence, they produce a potent pheromone**



After first mating she will dig into soil and lay 20 eggs

# Females feed and re-mate over the next 4-6 weeks



She will enter the soil up to 12 times to lay 40-60 more eggs



# Female fertilizes eggs with the most recent sperm she received



Males may stay attached to female for up to 2 hours after copulation, guarding her

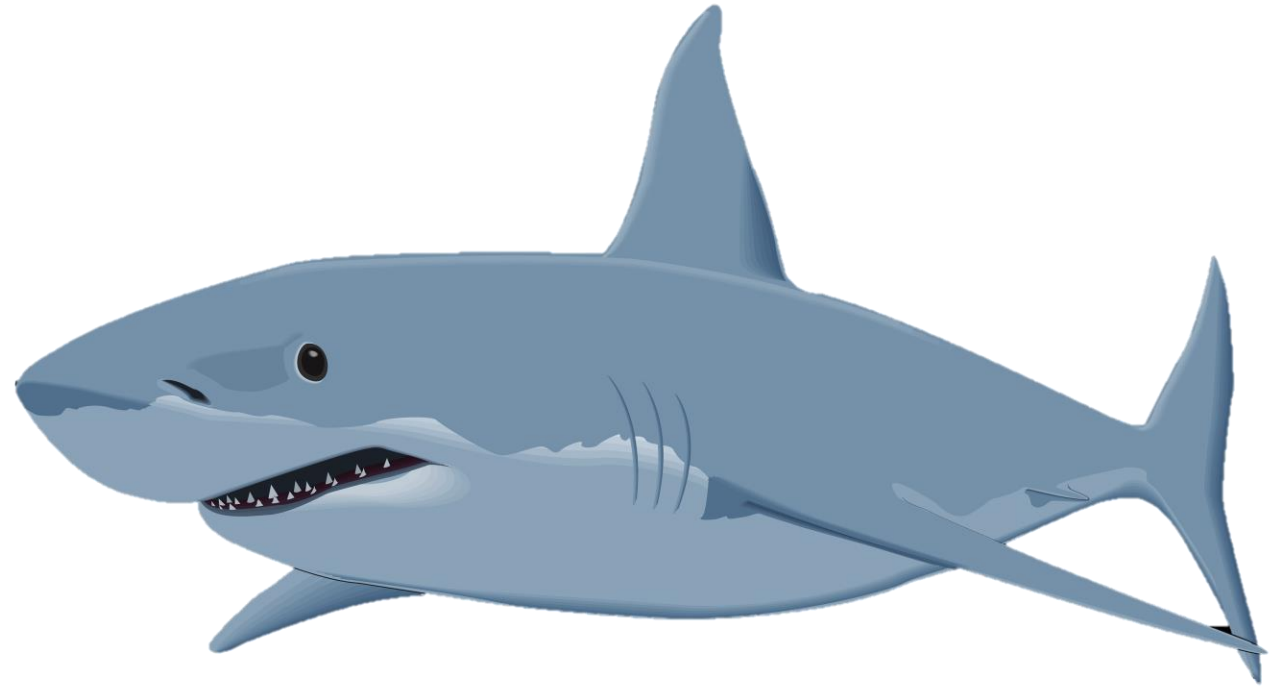
# There is “jousting” where a male will wrestle a competitor to mate



If you have ever wondered why they are stacked 3 or 4 deep on a leaf



**Japanese beetles do not produce an aggregation pheromone, they are attracted to damaged leaves**



Since females stop making sexual pheromones after first mating, this helps them to find one another



# Eggs are laid individually in the upper 3 inches of soil



Females tend to oviposit near food plants but can also be highly mobile to find ideal egg site



# Location, location, location: Females can be picky about egg sites



Looking for: Moderate soil texture, sunlit area, moderate to high soil moisture, and short grass cover



**Eggs hatch in 10-14 days and grubs develop over the next 5-7 weeks**



First instar grub stage lasts 2-3 weeks, second 3-4 weeks



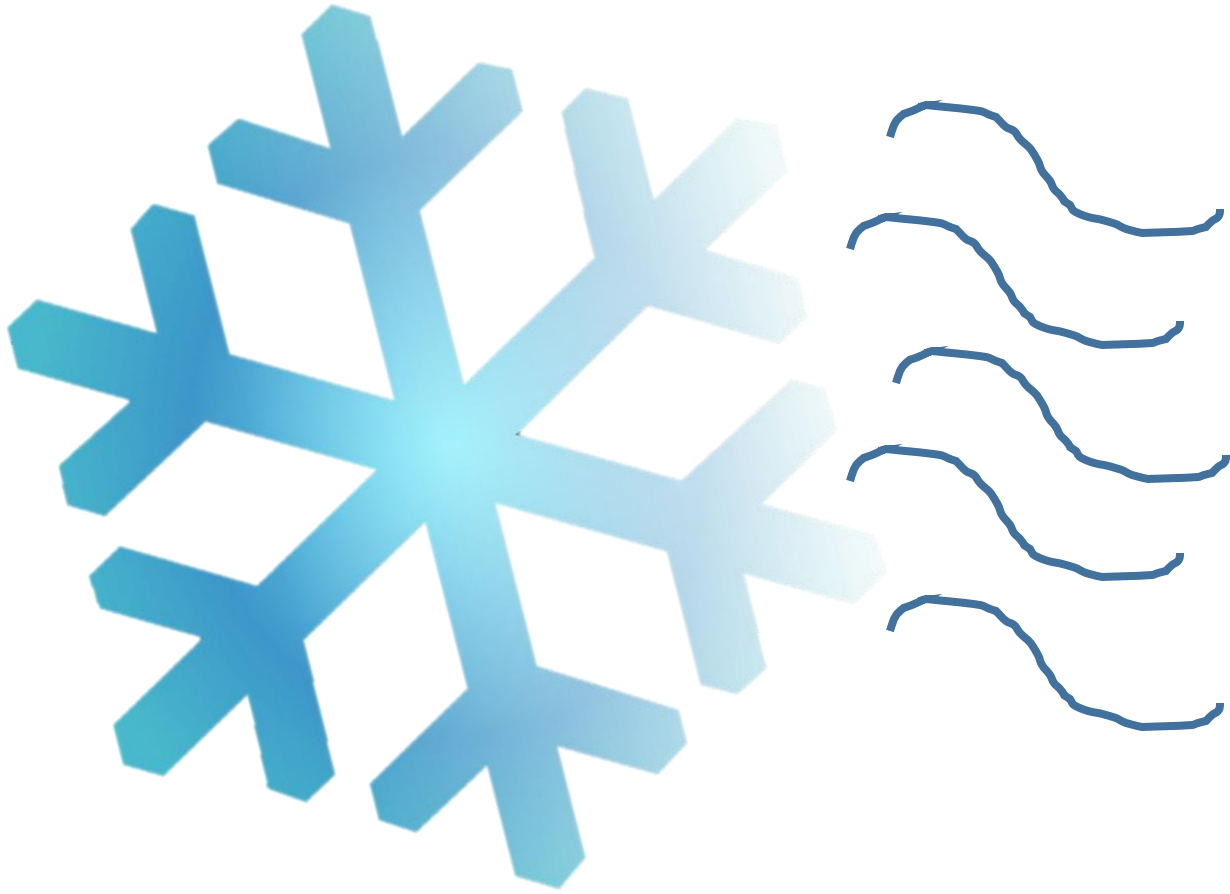
# Eggs and first instar grubs are sensitive to temperature and moisture fluctuation



Ants and other predators also consume many of them



# Grubs move to 6 inches deep in soil in early October to avoid frost



Have been found as deep as 8-10 inches as well



**In the spring, grubs move towards the surface and feed from March-April**



Stay as a pupae for 7-17 days before emerging as adult



# As pests Japanese beetles feed on >300 species of plants in 79 families



Some favorites include: walnuts, birches, elms, lindens, fruit trees, grapes, and roses



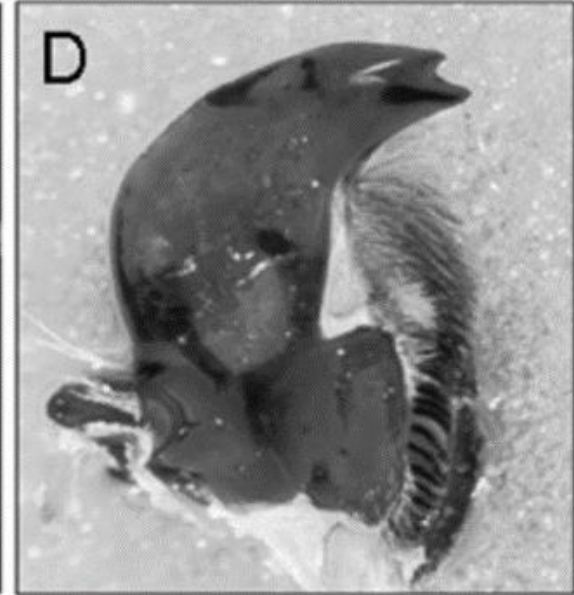
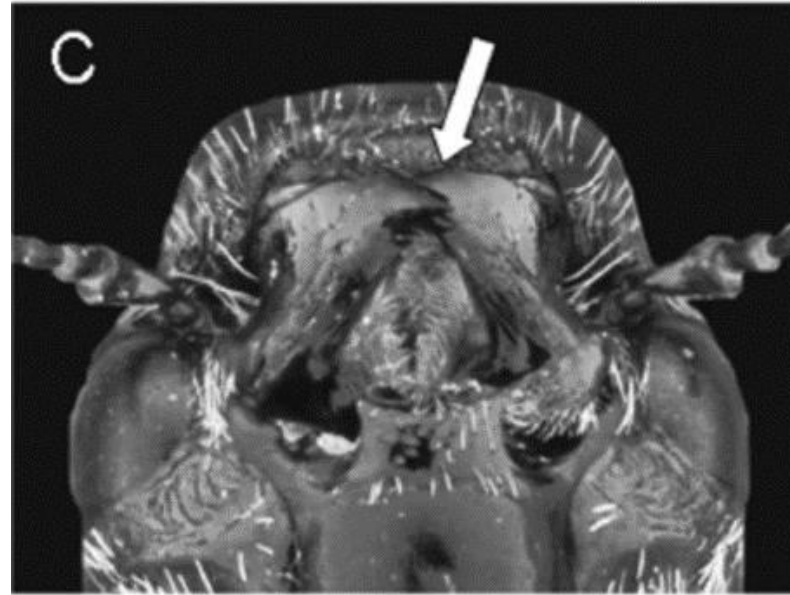
# Adult Japanese beetle damage to linden tree



Beetles feed from the top down, no matter how tall the plant



# Skeletonize leaves by feeding between veins



Japanese beetles have sharp mandibles that enable their polyphagy



**Can also feed on fruits (grapes, peaches, etc.) and flowers (roses)**



Chew into and hollow out fruits, shred flowers

# Damaged leaves can recruit 10-20 times more beetles than undamaged ones



Damaged leaves leak volatile compounds at 1200-1500 hours, peak JB flight and mating periods

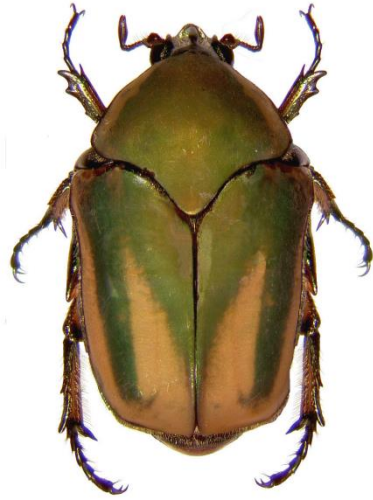


**As part of the white grub complex JB is a pest of turf as well**

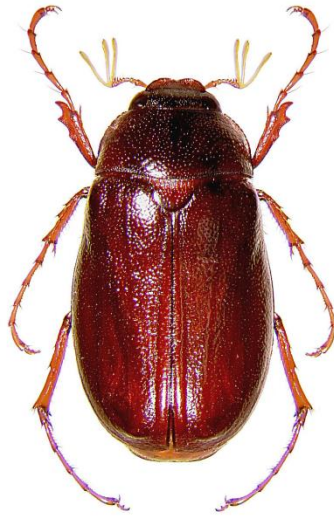


Grub stage is C-shaped, white, with orange-red head

# White grub rogues gallery



Green June Beetle



May-June Beetle



Masked Chafer



Japanese Beetle



Green June Beetle



May-June Beetle



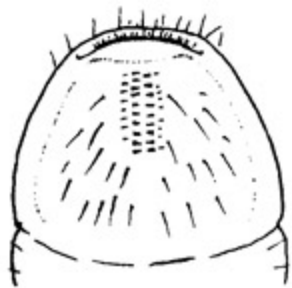
Masked Chafer



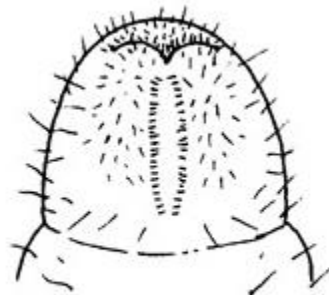
Japanese Beetle



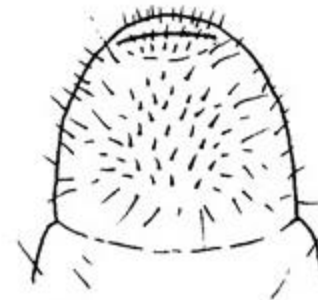
# White grub identification depends on the raster pattern at the posterior tip of grub



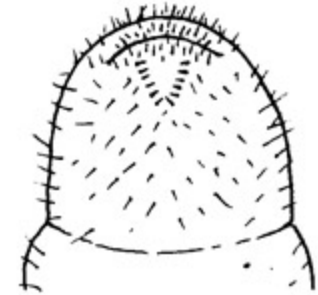
Green June beetle



May or June beetle



Northern-southern  
masked chafer



Japanese beetle

# Grubs feed at the soil-thatch interface



Feed on roots of turf, weeds, and some crops



# Grub damage is the worst in late summer and fall



Symptoms: Turf turns brown and easily rolls back, like a rug





# Secondary pests can occur with grub problems as well

Vertebrates arrive to consume them





*Yummy...*



?





# Know Your Grub Eating Critters



Raccoons roll turf



Skunks probe with snout





# Japanese beetle management involves multiple steps in the IPM mold





# First, controlling one stage doesn't ensure the other won't show up



Be prepared for a lot of hard work

Grub control applications will not ensure adults don't fly in from surrounding areas, treating for adults doesn't mean you won't get grubs



# Start with grubs- There are 2 Approaches to grub control Preventative or Rescue treatments



Differences in time of application and amount of damage that can be accepted



# Preventive Grub Insecticides

## Neonicotinoids

Imidacloprid



Clothianidin



Thiamethoxam



## Anthranilic Diamides







Optimal timing for preventive control:  
**May to mid-July**





Modern preventive grub products are highly effective when applied correctly



# Preventive grub control requires post-treatment irrigation



These products are systemic, but have to get to the root zone in order to be effective



**Rescue treatments are applied after damage has already occurred**





# Rescue Treatments:

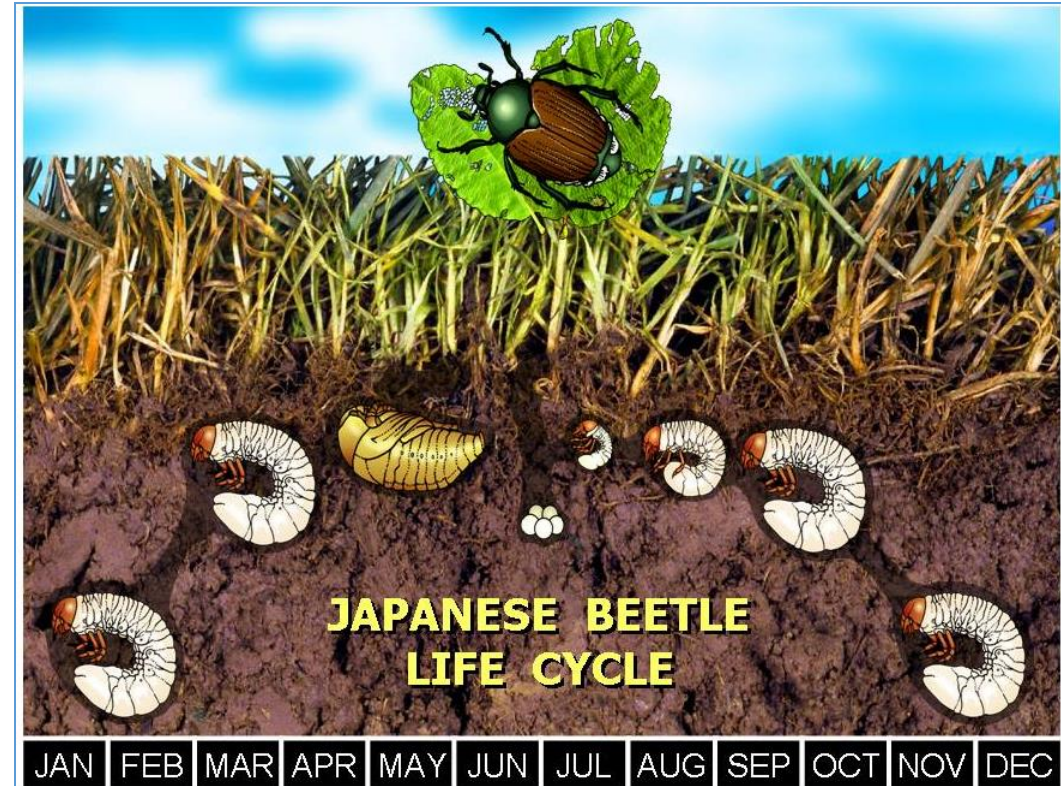
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- Expect no more than 75% control once grubs are large
- 2 main products used: Dylox or the neonicotinoid Arena
- Acelepryn is NOT a curative product





# Cultural methods can interfere with grub establishment



Withholding irrigation in June/July, fertilizing in spring with aluminum sulfate, raising cutting height to 7" all reduce grubs pop.



# Biological control: 2 nematodes, *S. carpocapsae* and *H. bacteriophora* show promise in turf



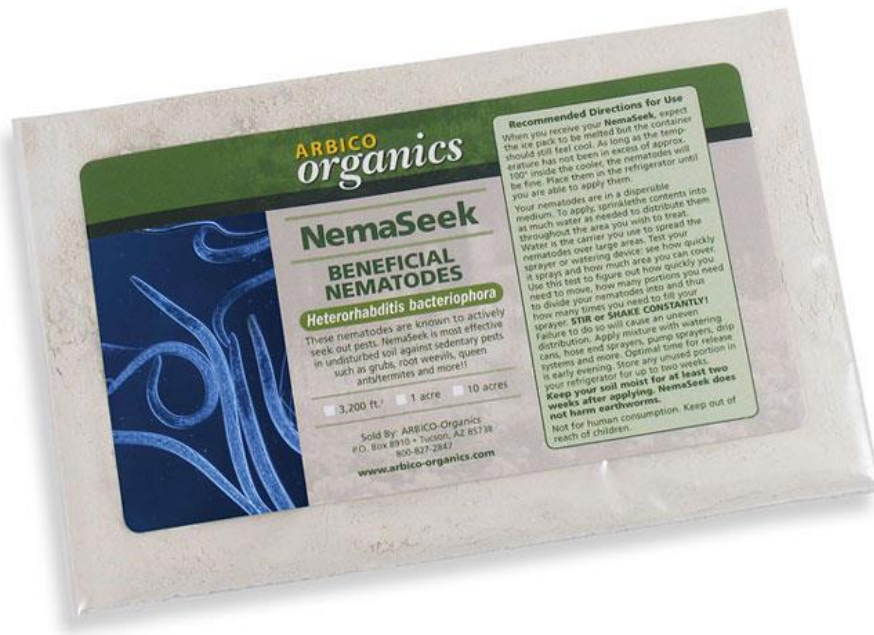
Can successfully suppress white grubs, caterpillars, and bill bugs



# Nematode products

**Nemasys G<sup>®</sup>** (from Becker Underwood)

**NemaSeek<sup>®</sup>** (from Arbico Organics)



## European Chafer Grub Killer Nemasys<sup>®</sup> G

Order your European Chafer Solution NOW!

- Safe & Natural Control of European Chafer
- Only Nemasys product with a patent protected strain which has been tested successfully against the European Chafer
- Recommended Rate is 50 million (1 pack) per 70 m<sup>2</sup> (750 ft<sup>2</sup>)
- Target Application date range is July 15- 31st
- Order at your local garden centre to ensure availability for target application dates

As Researched & Supported by Dr. Deborah Henderson (E.S. Gropenmatt Ltd.), The Western Canadian Turfgrass Association, Canadian Nursery & Landscape Association and local municipalities.

### European Chafer

#### What is it?\*

Adult European chafers are tan or brown beetles resembling June beetles but are slightly smaller measuring about 1.5cm in length. The larvae or grubs are soft, white and C-shaped with tan-coloured heads and six prominent legs. Grubs measure 2 to 2.5cm in length when full grown.

#### The Damage\*

The grubs of this insect feed on roots of many different plants but prefer the fibrous roots of turfgrasses.



Damage can be masked by abundant moisture in spring and fall but drier weather quickly results in the appearance of brown, dying patches.

The presence of large European chafer grubs in turf may attract birds, skunks and other predators, from fall to early spring, with sometimes devastating results as the predators turn over the lawn in search for these insects. The adult beetles seldom cause any significant damage, even when they swarm in large numbers at dusk. The short lived adult beetles do not bite or sting.

\* Courtesy of European Chafer / A New Turf Pest, presented by the CMA and the WCTA

For more information on European Chafer visit Westgro Sales' website at [www.growercentral.com](http://www.growercentral.com) or one of the following informative websites:  
[www.cityburnaby.bc.ca](http://www.cityburnaby.bc.ca) - City of Burnaby  
[www.nwp.bc.ca/](http://www.nwp.bc.ca/) - New Westminster Parks and Recreation  
[www.agf.gov.bc.ca/cropprot/chafer.htm](http://www.agf.gov.bc.ca/cropprot/chafer.htm) - Agriculture Canada





# Nematodes do have some biological limitations you have to remember



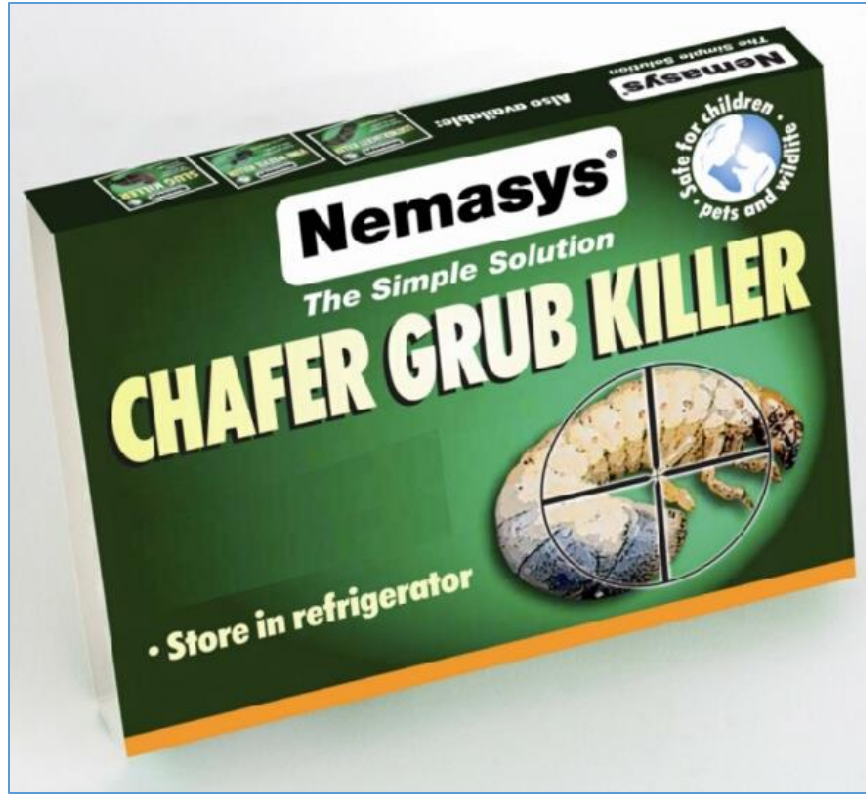
They don't deal with the  
sun/heat



Require post-  
treatment irrigation



# There are also troubles with getting the nematodes to the consumer



They have a limited shelf life in package



Curative control only



# Relatively high cost still when compared to insecticides

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**Gardens Alive: \$1000**

*About \$24*

**Becker Underwood: \$130**



***Tiphia vernalis* parasitizes >50% of Japanese beetle grubs in an area!**





# Always lots of questions about Milky Spore



Milky Disease

Normal Grub



# Commercial milky spore dust is commonly sold for Japanese beetle control



## Details

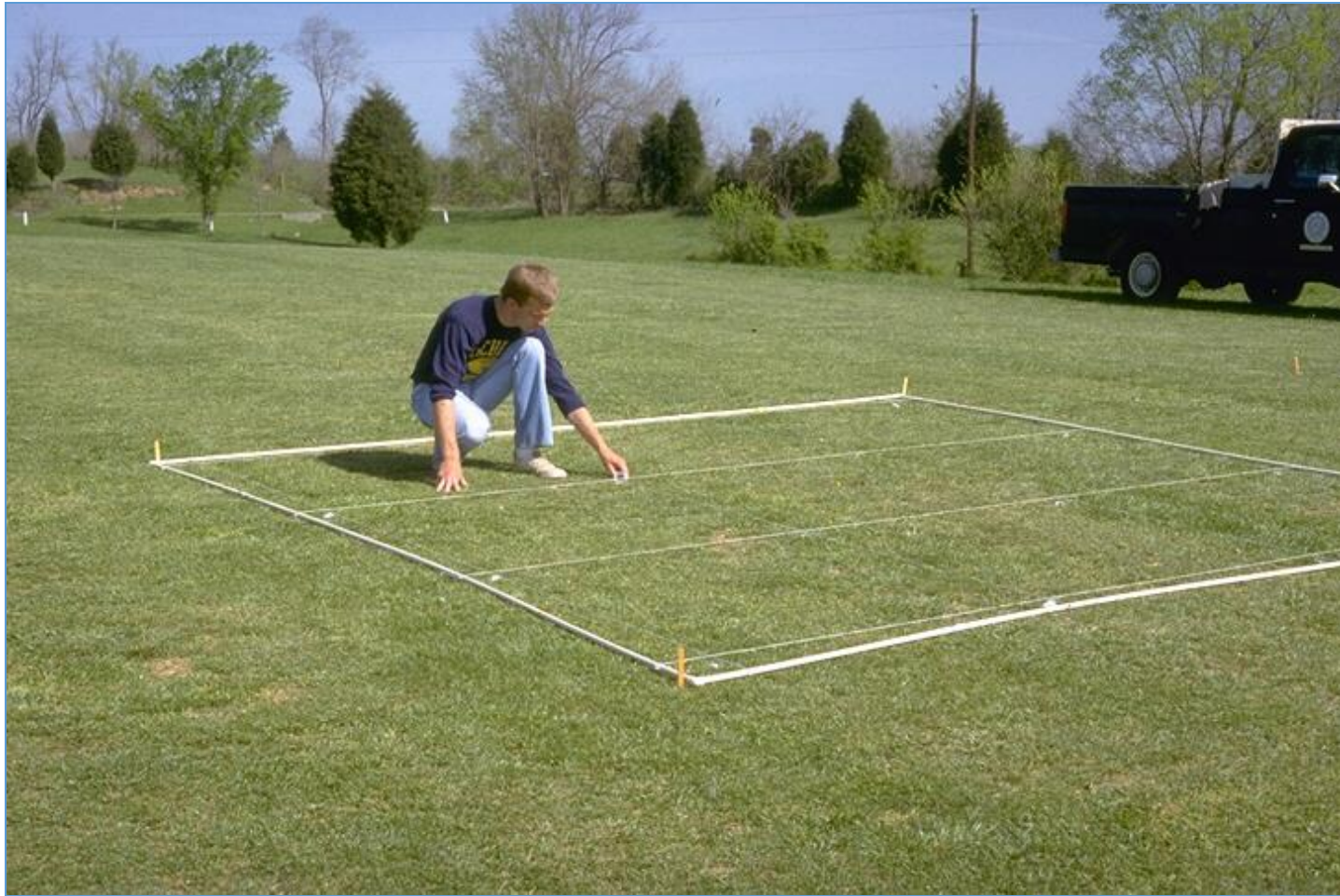
Milky Spore can be applied anytime the ground is not frozen. Not harmful to people, animals or the environment. Does not harm beneficial insects. Kills the grub stake of the Japanese beetle. Natural bacteria eats the grub from the inside. Safe for use around waterways. Milky Spores don't die, they just multiply and accumulate in the soil lasting for years and the benefits are guaranteed for 10 years. Milky Spore is organic. Just one spore consumed by a grub will multiply into 3 billion new spores when the grub dies.

Requires three applications per year for two years. 20 pound bag treats 7,000 square feet.

Mily spore is attractive to consumers due to “natural” properties and long-term promises of suppression



# University trials showed **NO BENEFIT** from applying milky spore powder



Naturally occurring milky spore does kill some grubs, applications do not

# Japanese beetle adult control with synthetic products: Foliar sprays during peak flight

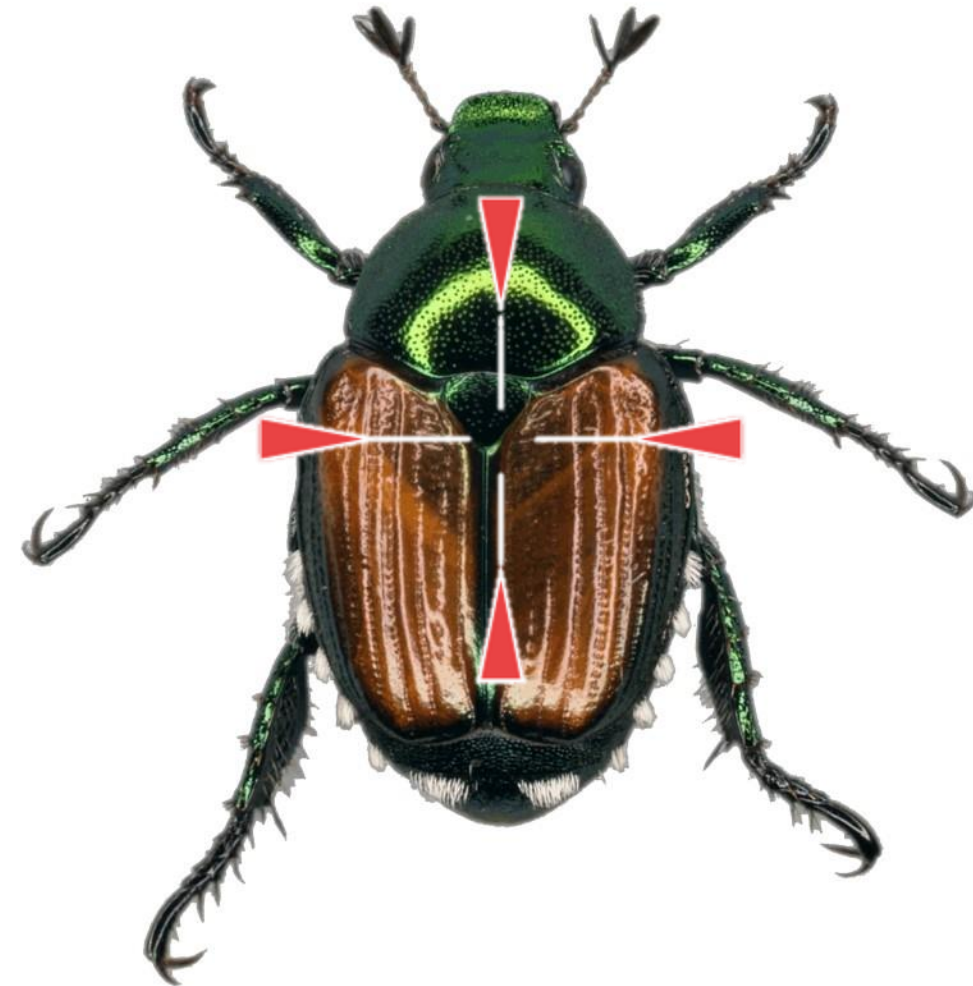
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**Acelepryn** (4 weeks residual)

Pyrethroids

- **Onyx** (4 weeks)
- Talstar (2-3 wks)
- Scimitar
- Tempo

Sevin (1-2 weeks residual)





# Soil applied imidacloprid, put down in April or May, can help to protect plants



**CANNOT TREAT LINDEN TREES**

You must remove mulch from base of plant and apply after flowers have fallen from the tree

# Pyola and Neem are organic options for adult Japanese beetles control

- Pyola® (Gardens Alive)
- Neem (Azadiractin) products







Untreated

Neem

Untreated

Pyola®

# Plan or change your landscape to deal with Japanese beetle

## Highly susceptible:

- Most lindens
- Purple leaf plum
- Purple sandcherry
- Norway & Jpn. maple
- Roses
- Certain crabapples

## Resistant:

- Red maples
- Dogwoods
- Redbud
- Beech
- Tuliptree
- Sweet gum




# Hand picking seems labor intensive, but is quite effective at protecting smaller plants



Kill by placing them in a bucket of soapy water, collect at 7 pm for maximum efficacy



# Also want to take a moment to discuss JB traps



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## Japanese Beetle Trap

Powerful trap attracts adult beetles like a magnet

When squadrons of adult Japanese beetles attack, be ready with our highly effective pheromone trap. This trap:

- controls Japanese beetles without sprays and without mess—simply change the bag when it's full.
- catches and confines more beetles than any other trap we've tested—it's the trap we use at our research farm.
- protects plants throughout the season.



Commonly used, perhaps shouldn't be!





429,562 beetles: 10 day's catch

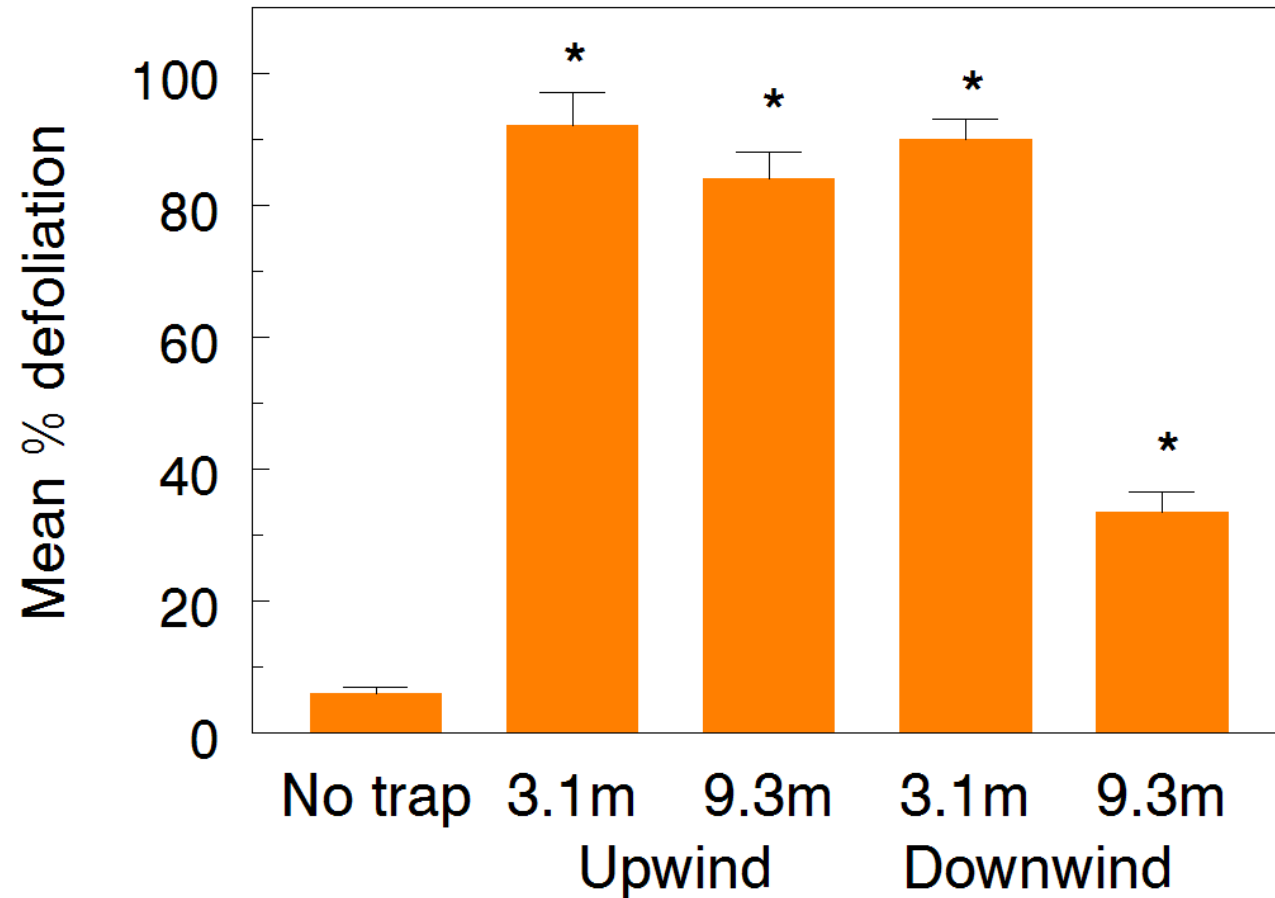






# Traps can lead to higher rates of defoliation for the plants meant to be protected!

(Gordon & Potter, JEE, 1985, 1986)







# Questions?



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- @JLarson\_UNL