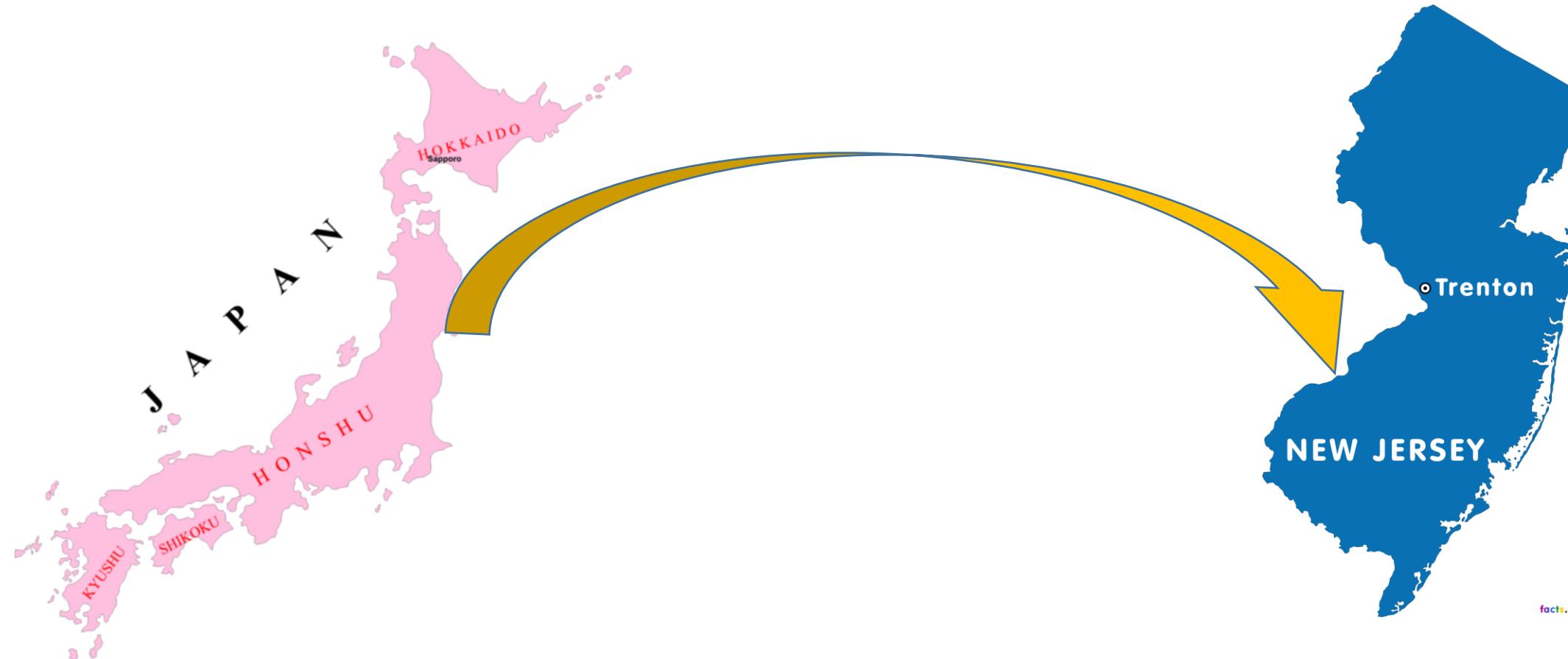


Beetle Mania: Deep dive on Japanese beetles



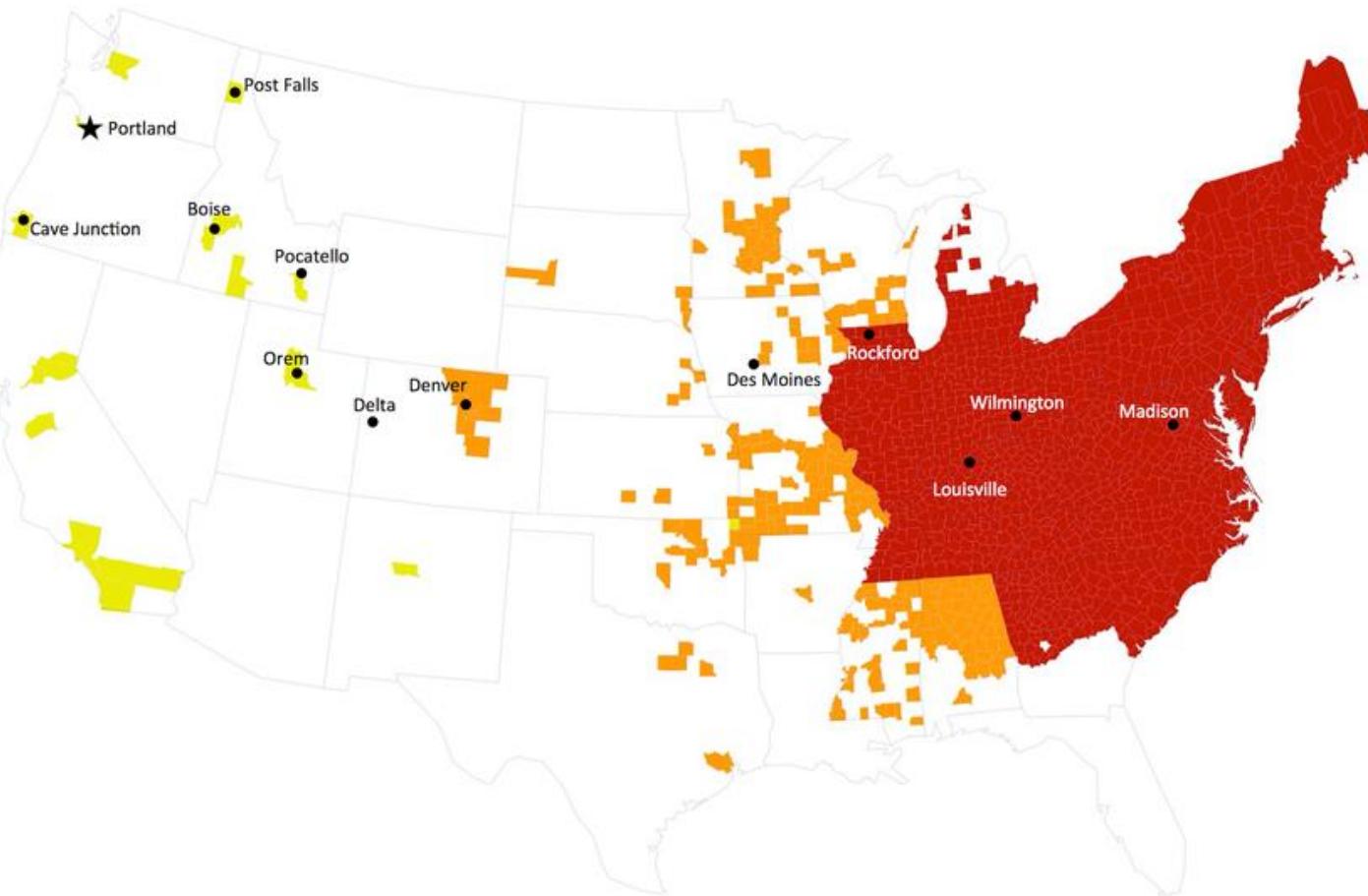
Matthew Beziat

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



© MATT BERTONE 2015



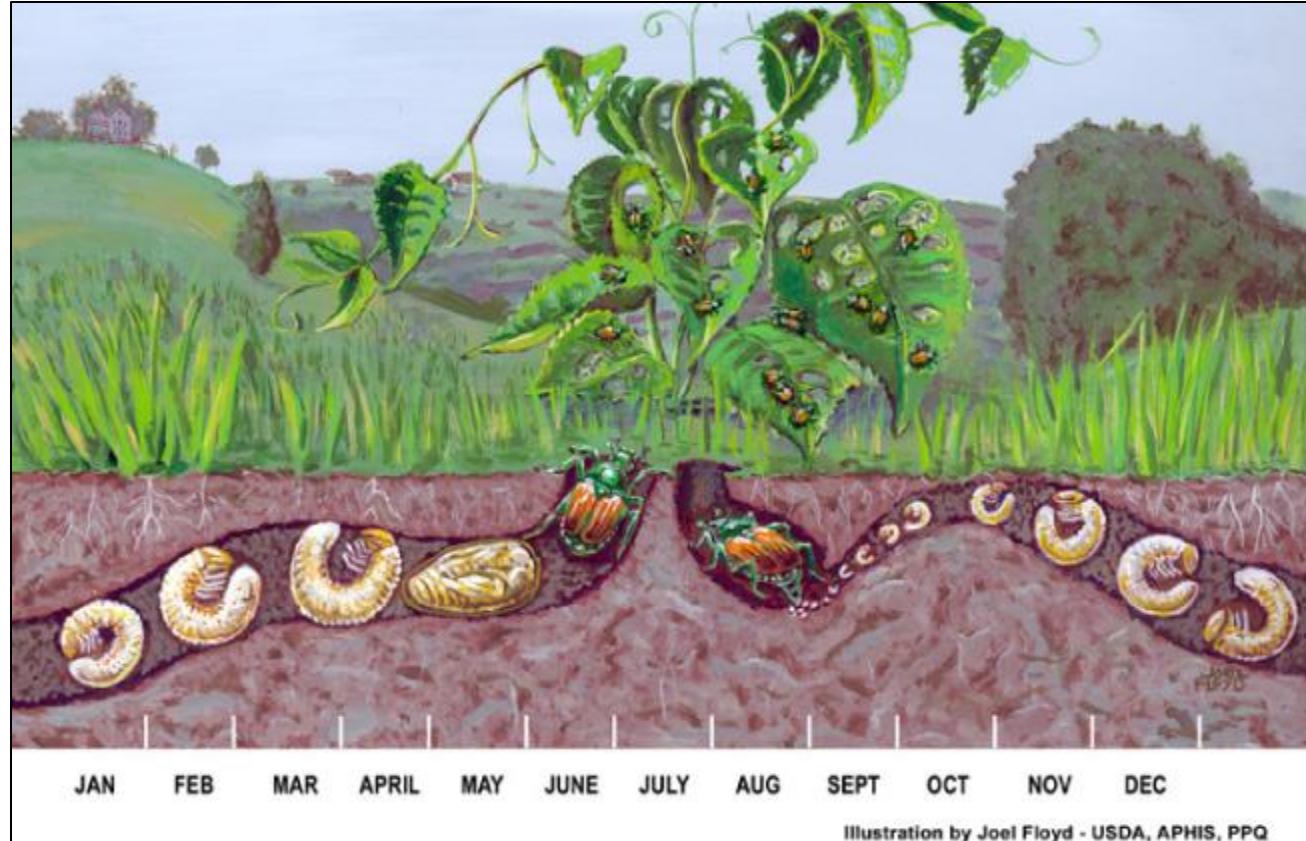
An inch or longer with green and gold coloration, can be a minor pest

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



U. Minnesota



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



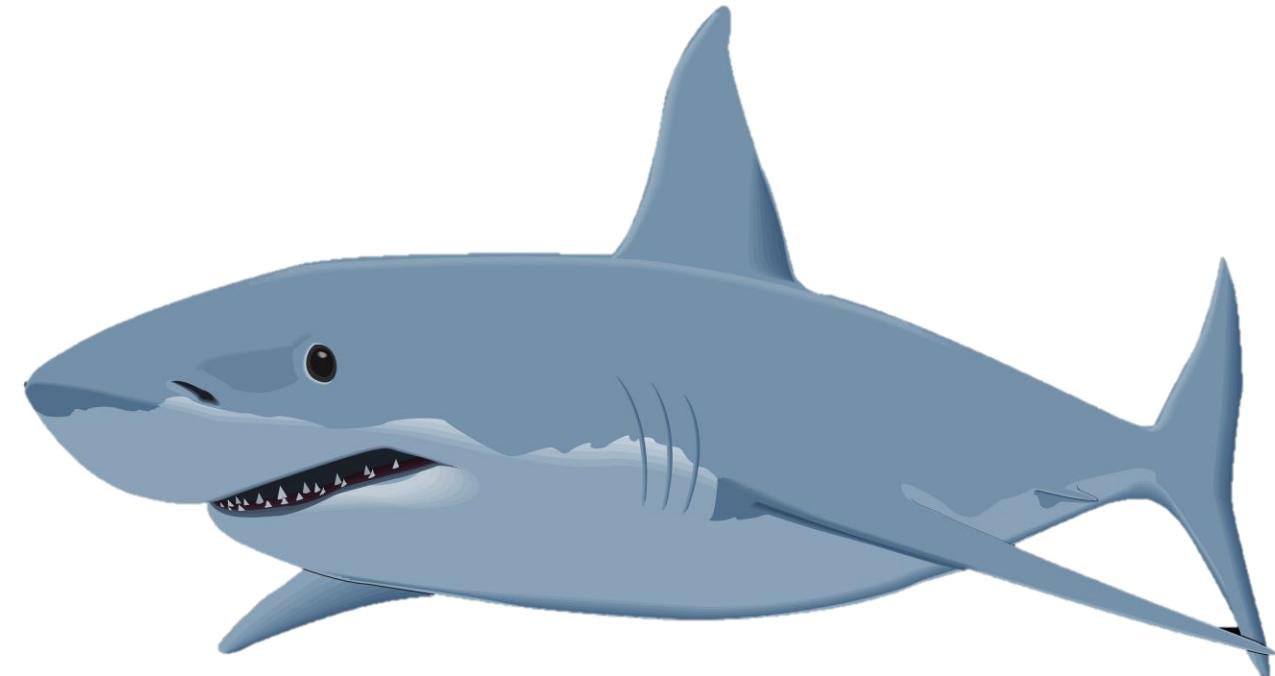
Males may stay attached to female for up to 2 hours after copulation, guarding her

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



Photo credit: Bob Mugaas, U of MN

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



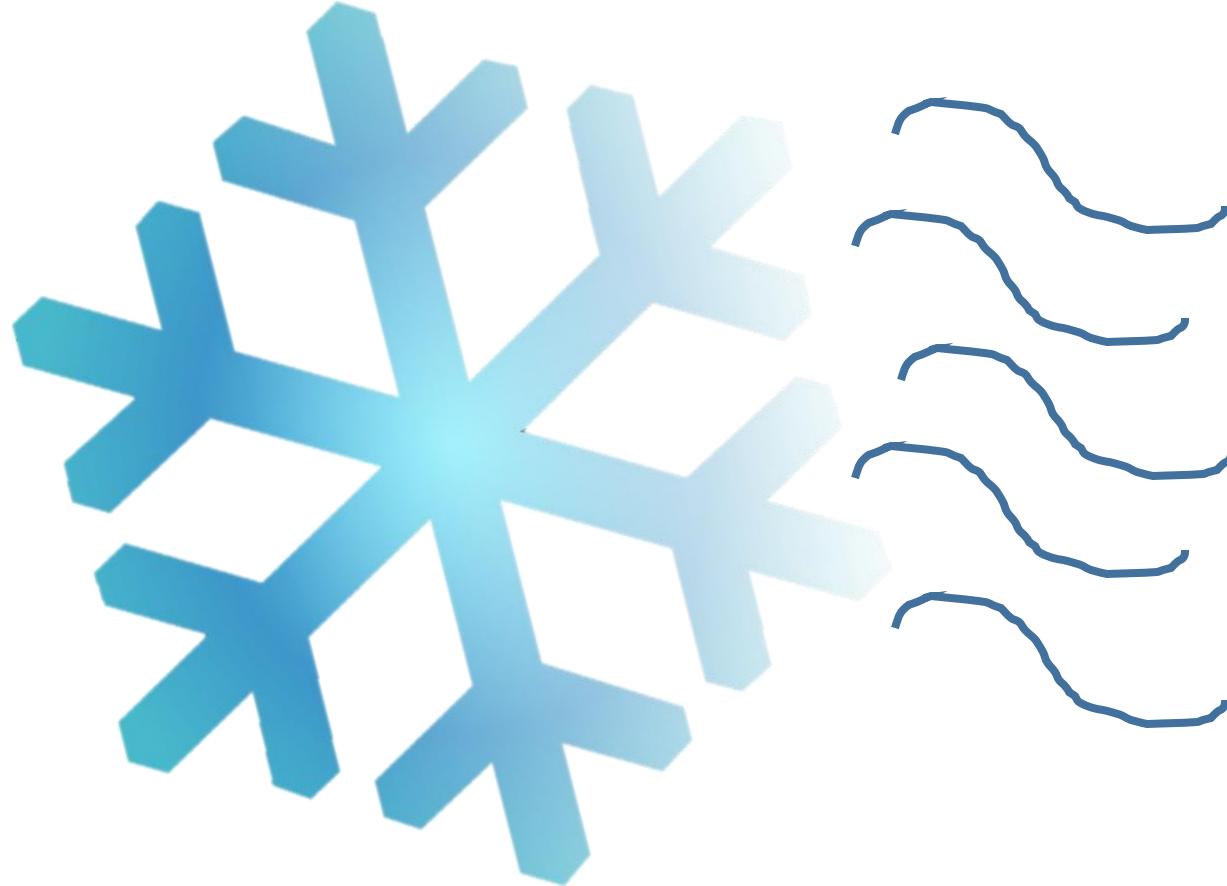
First instar grub stage lasts 2-3 weeks, second 3-4 weeks

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



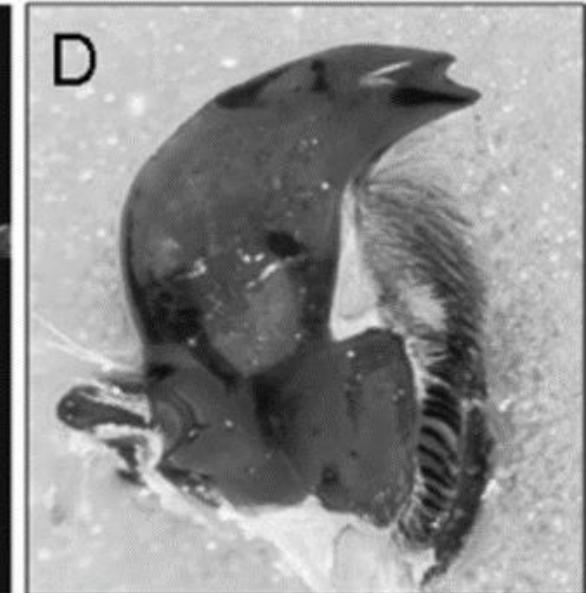
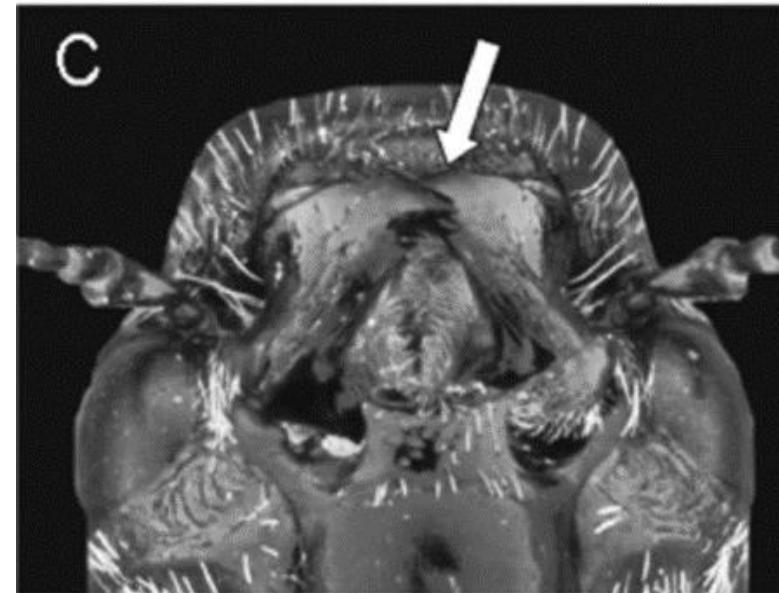
July 8



July 18

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

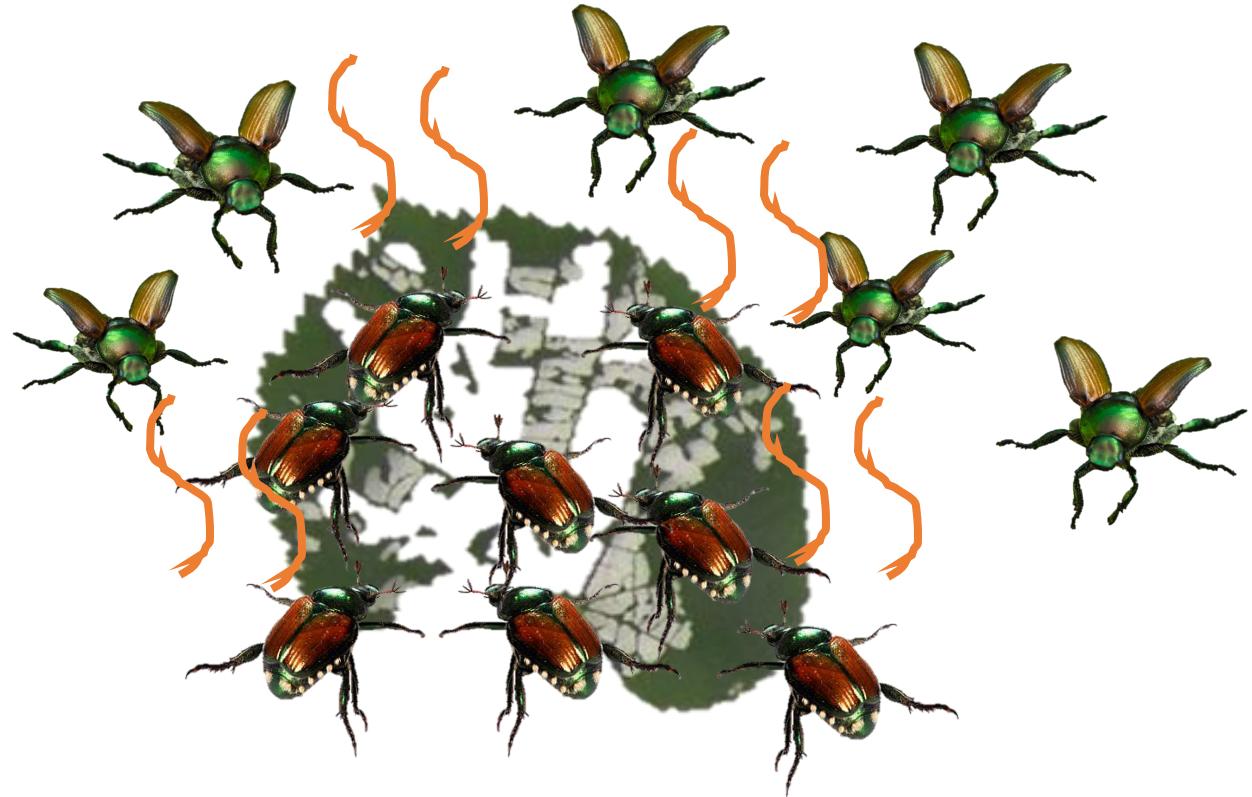
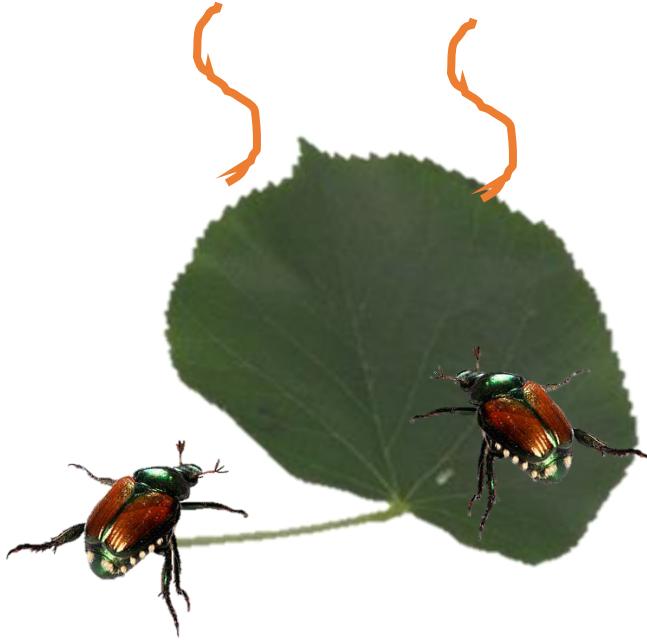
Can also feed on fruits (grapes, peaches, etc.) and flowers (roses)



UGA0177037

Chew into and hollow out fruits, shred flowers

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



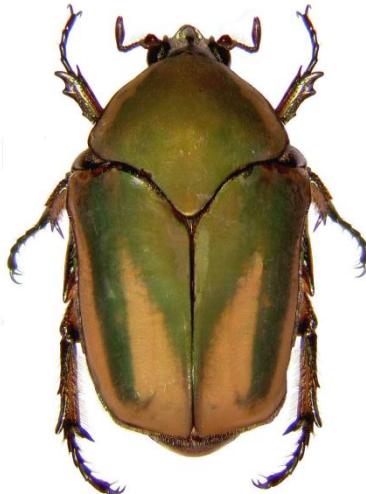
Damaged leaves leak volatile compounds at 1200-1500 hours, peak JB flight and mating periods

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

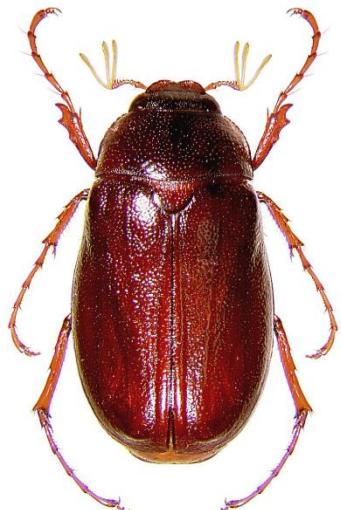


Grub stage is C-shaped, white, with orange-red head

White grub rogues gallery



Green June Beetle



May-June Beetle



Masked Chafer



Japanese Beetle



Green June Beetle



May-June Beetle

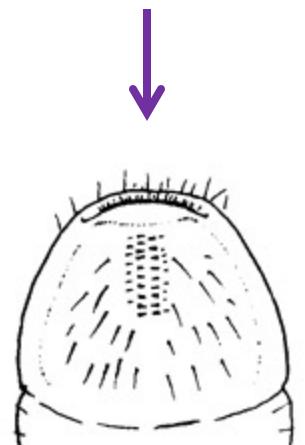


Masked Chafer

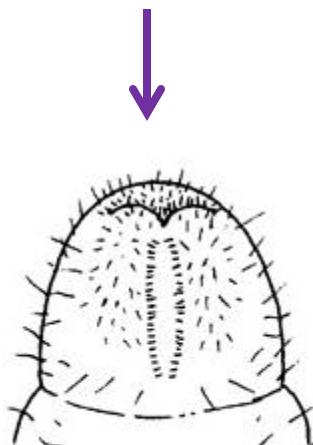


Japanese Beetle

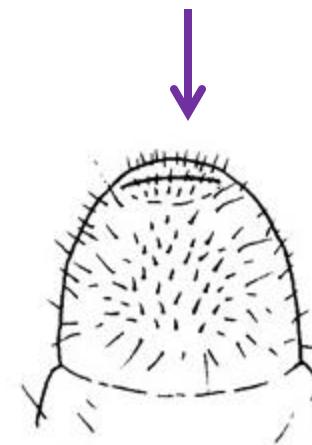
White grub identification depends on the raster pattern at the posterior tip of grub



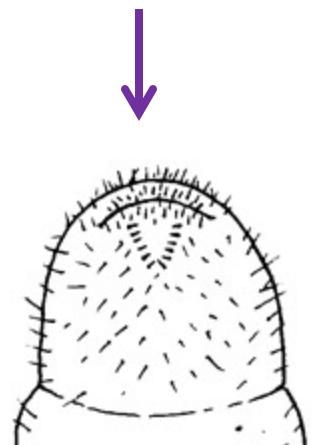
Green June beetle



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



Tashiro



James Kalisch

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

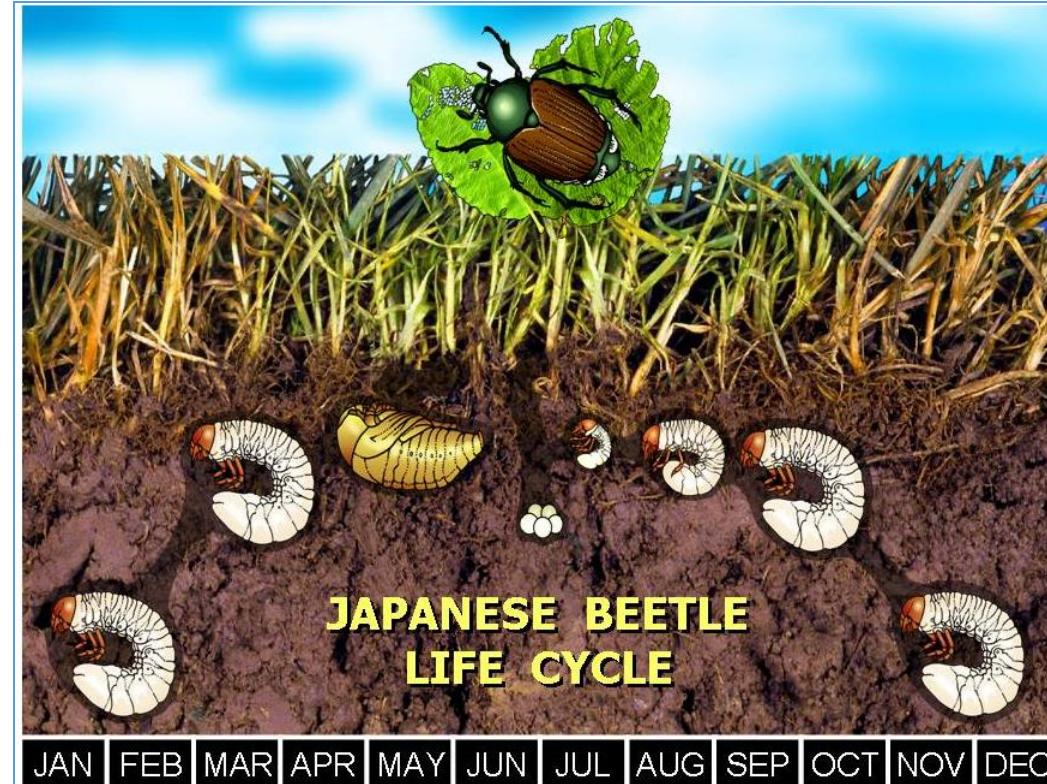


Rescue Treatments:

- 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® (from Becker Underwood)

NemaSeek® (from Arbico Organics)



European Chafer Grub Killer Nemasys® 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 m² (750 ft²)
- Target Application date range is July 15- 31st
- Order at your local garden centre to ensure availability for target application dates

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

European Chafer

What is it? Adult European chafer 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.

*Courtesy of European Chafer A New Pest Pest, presented by the CNA and the WCTA

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.

For more information on European Chafer visit Westro Sales' website at www.growercentral.com or one of the following informative websites:

www.cityburnaby.bc.ca/-City of Burnaby
www.mwpbc.ca/-New Westminster Parks and Recreation
www.agr.gov.bc.ca/croppro/chafer.htm-Agriculture Canada

Nematodes do have some biological limitations you have to remember

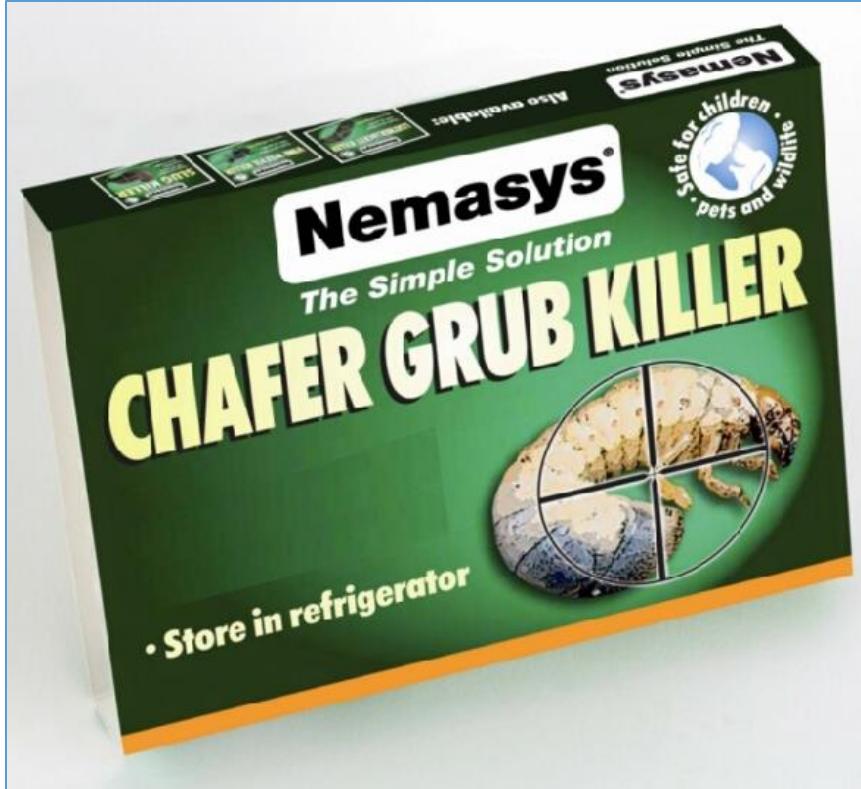


They don't deal with the sun/heat



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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Quickly controls a wide range of destructive garden and lawn pests

Grub-Away is easy to use on lawns and gardens. Just mix with water and fill your usual garden sprayer.

Only from gardens alive! Grub-Away parasitic nematodes are the effective, non-chemical answer to a wide range of lawn and garden problems! We think they're one of the best all-purpose, natural pest controls available.

More...

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5002 Grub-Away™ Nematodes pkg of 25 million	\$54.95	Quantity <input type="text"/>
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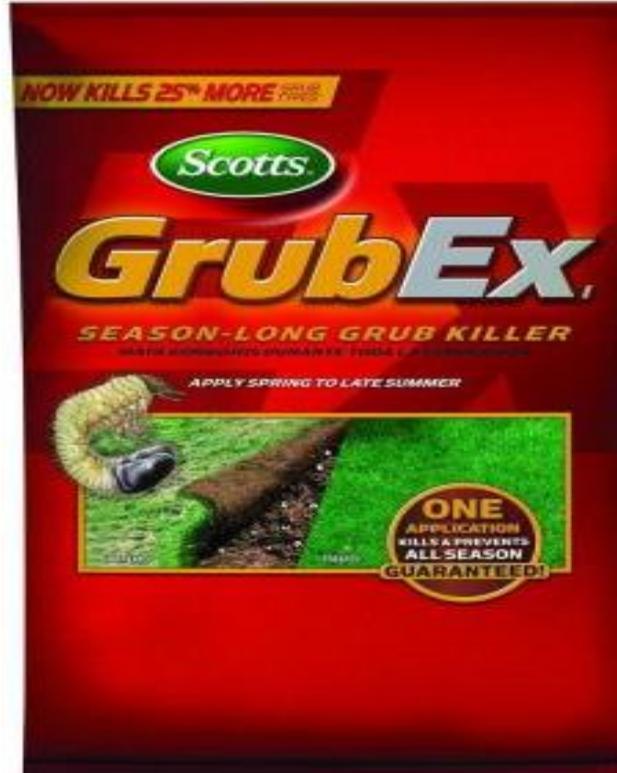
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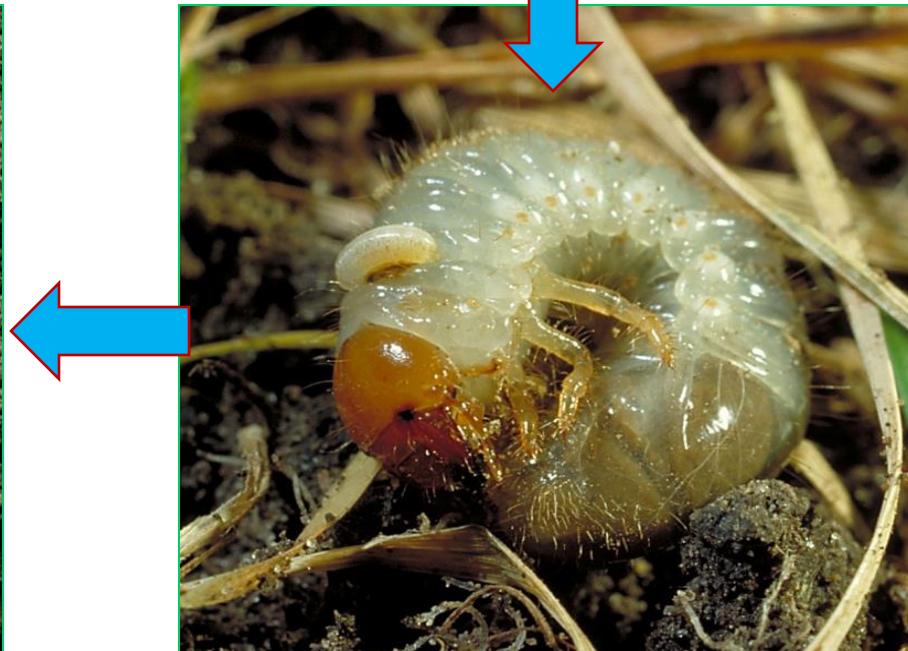


Gardens Alive: \$1000

Becker Underwood: \$130

About \$24

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



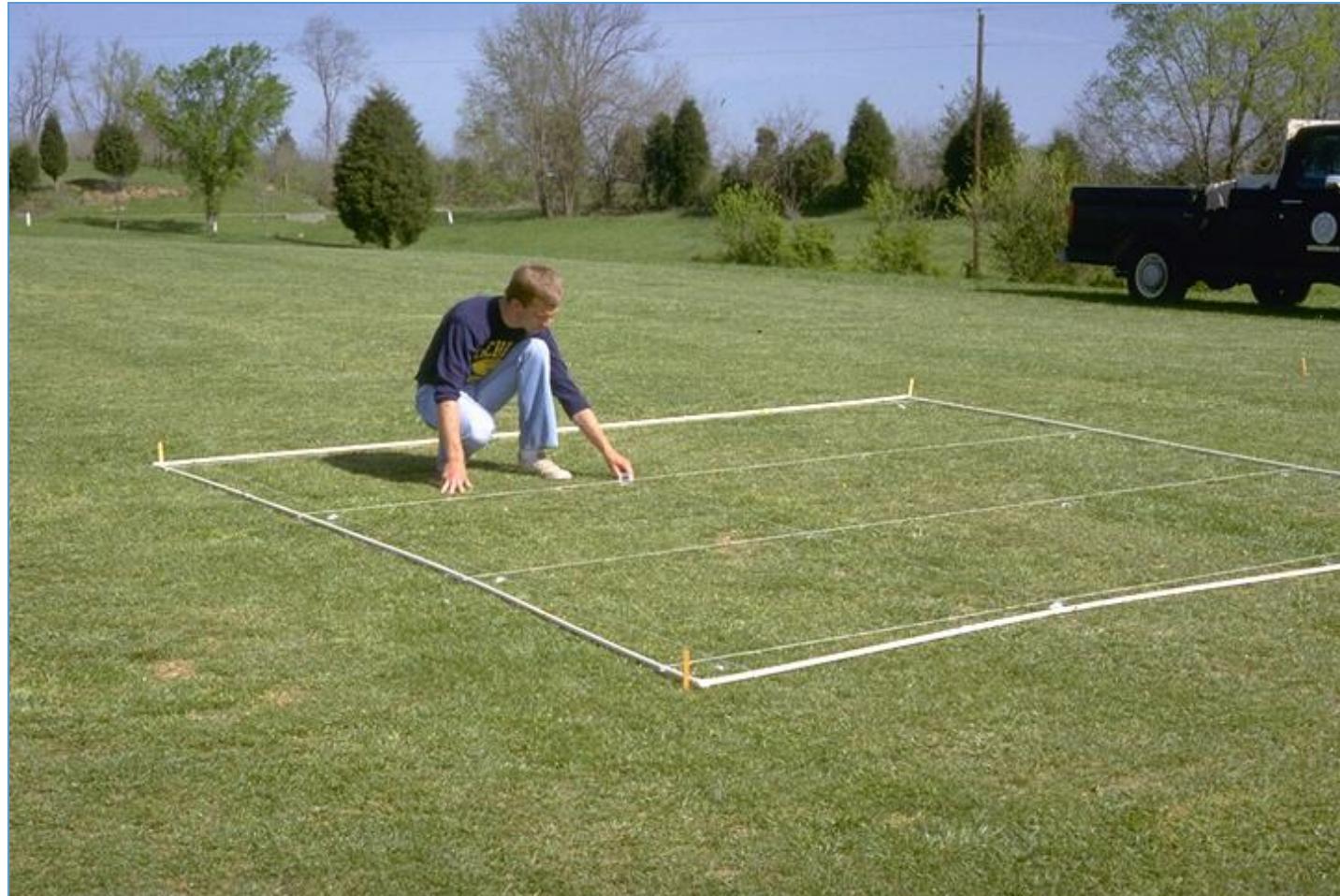
Details

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.

Milk 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

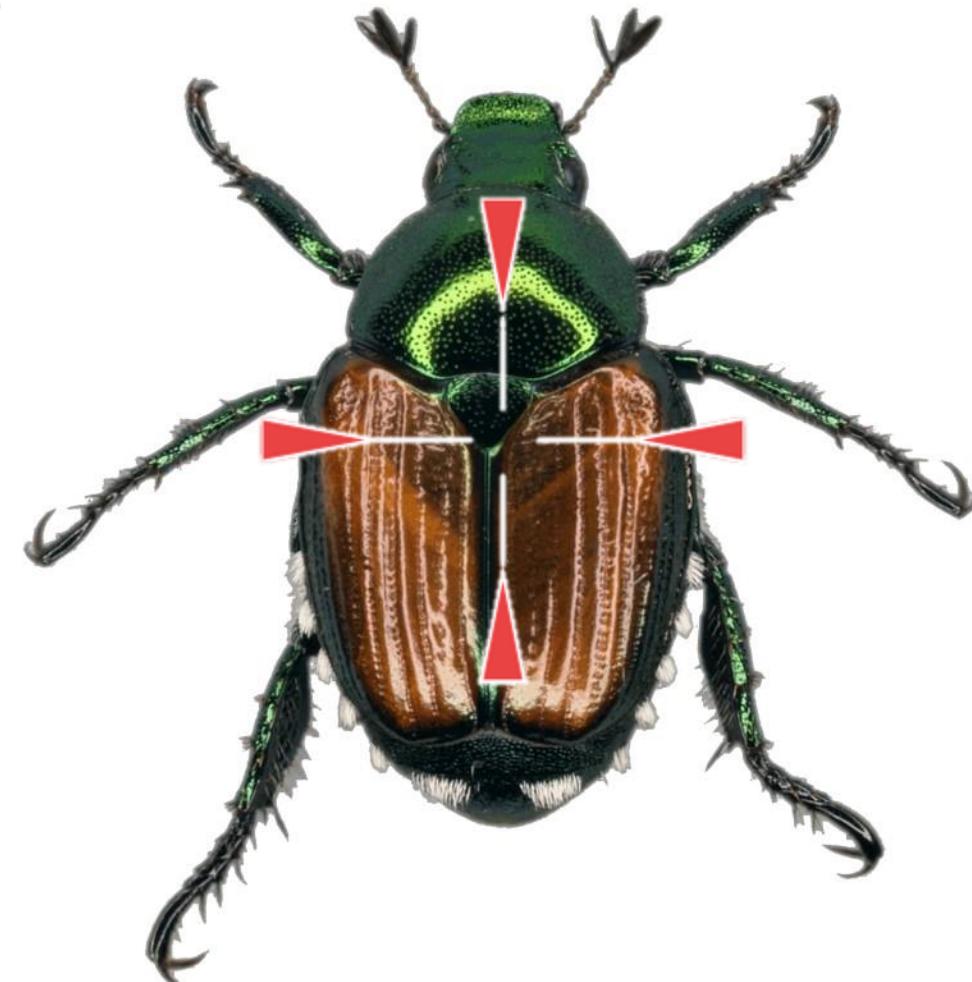
Japanese beetle adult control with synthetic products: Foliar sprays during peak flight

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



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 (Azadirachtin) 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!

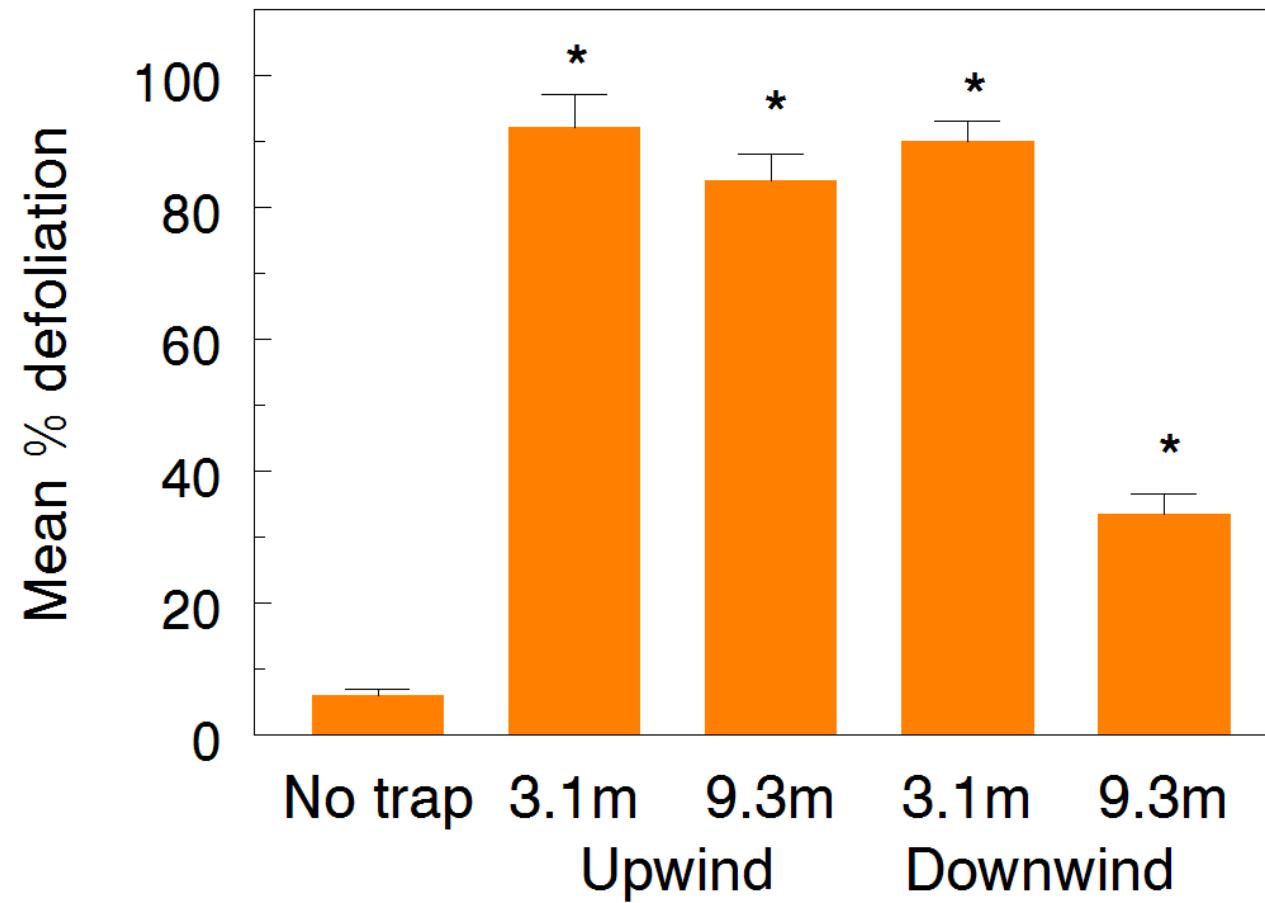


429,562 beetles: 10 day's catch



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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- jonathan.Larson@unl.edu
- @JLarson_UNL