Beetle Mania: Deep dive on Japanese beetles

College of Agriculture, Food and Environment
Entomology

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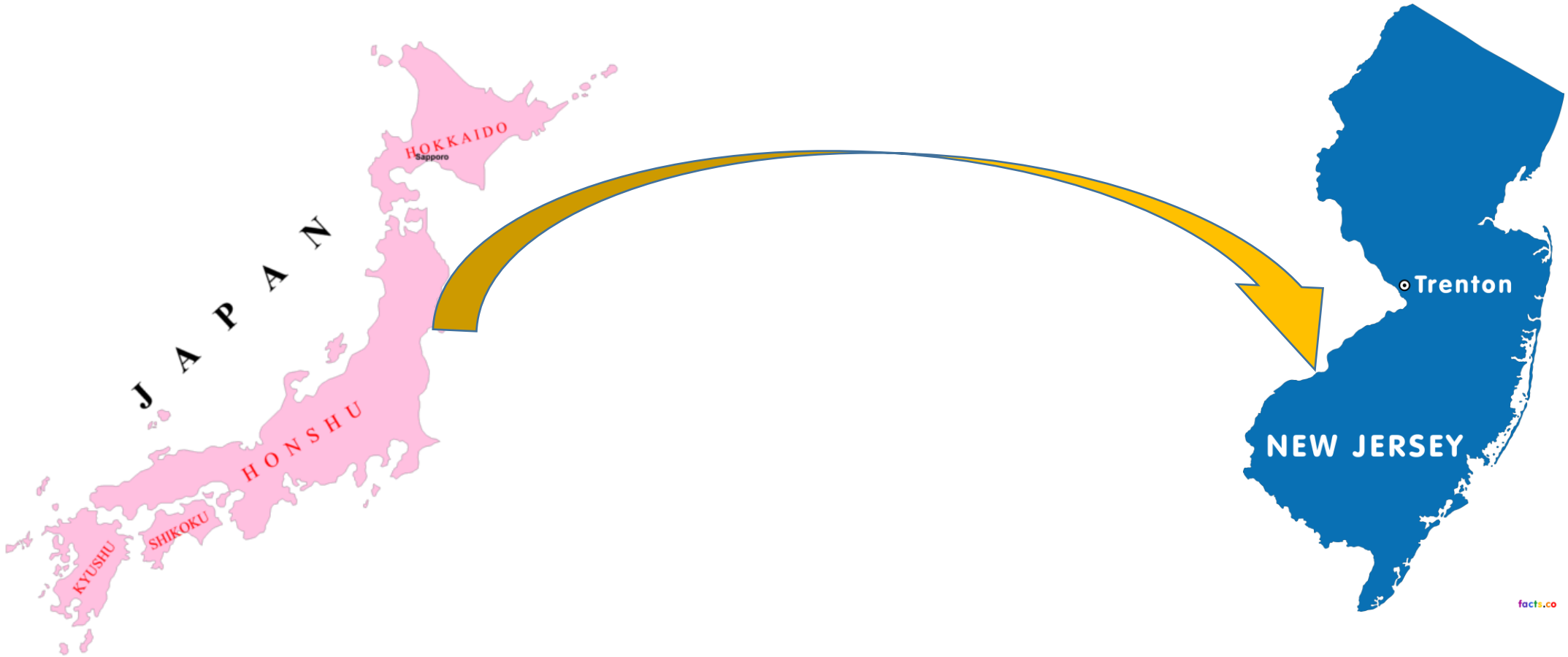
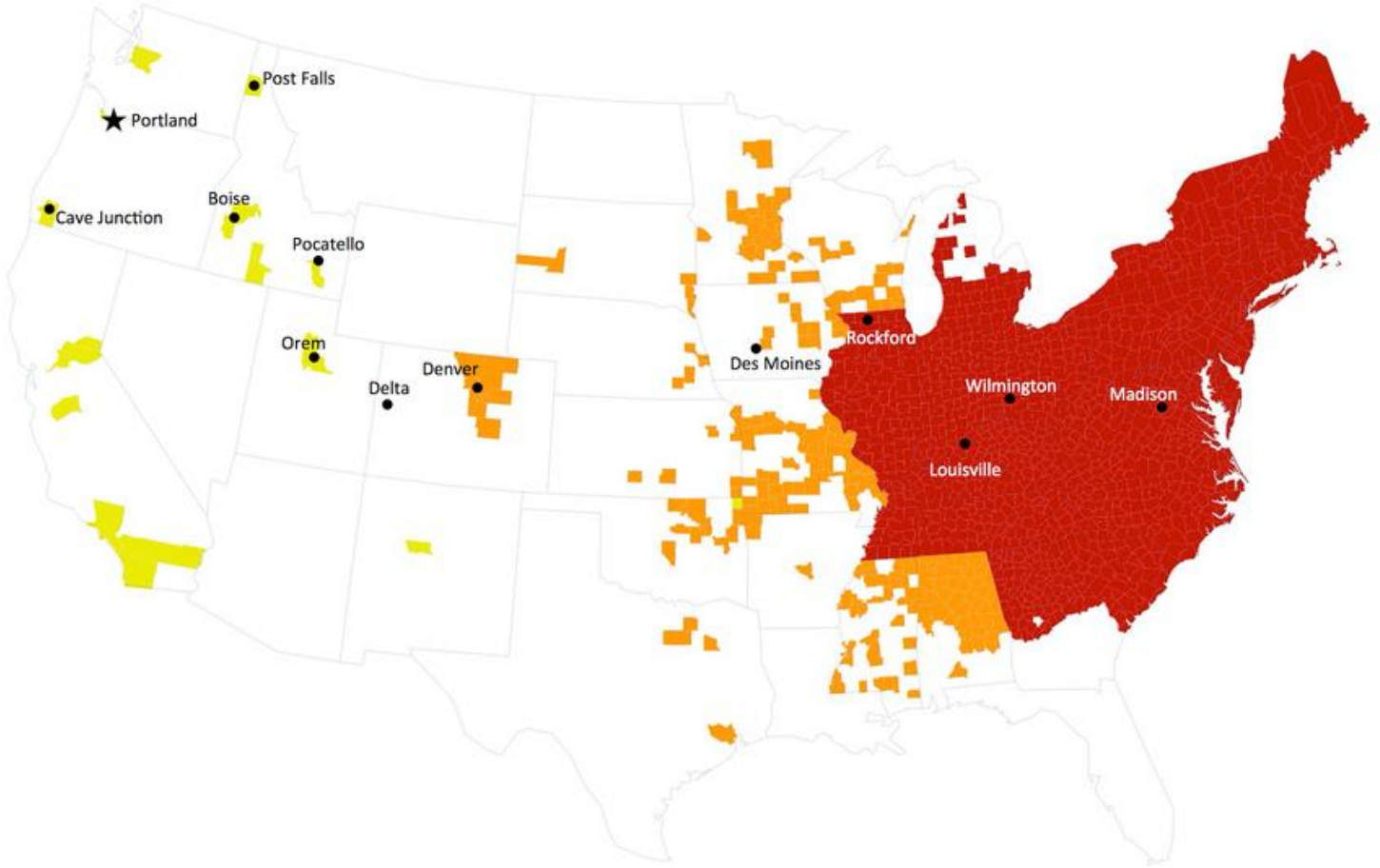
Prior to 1916, the Japanese beetle was known only on the main islands of Japan



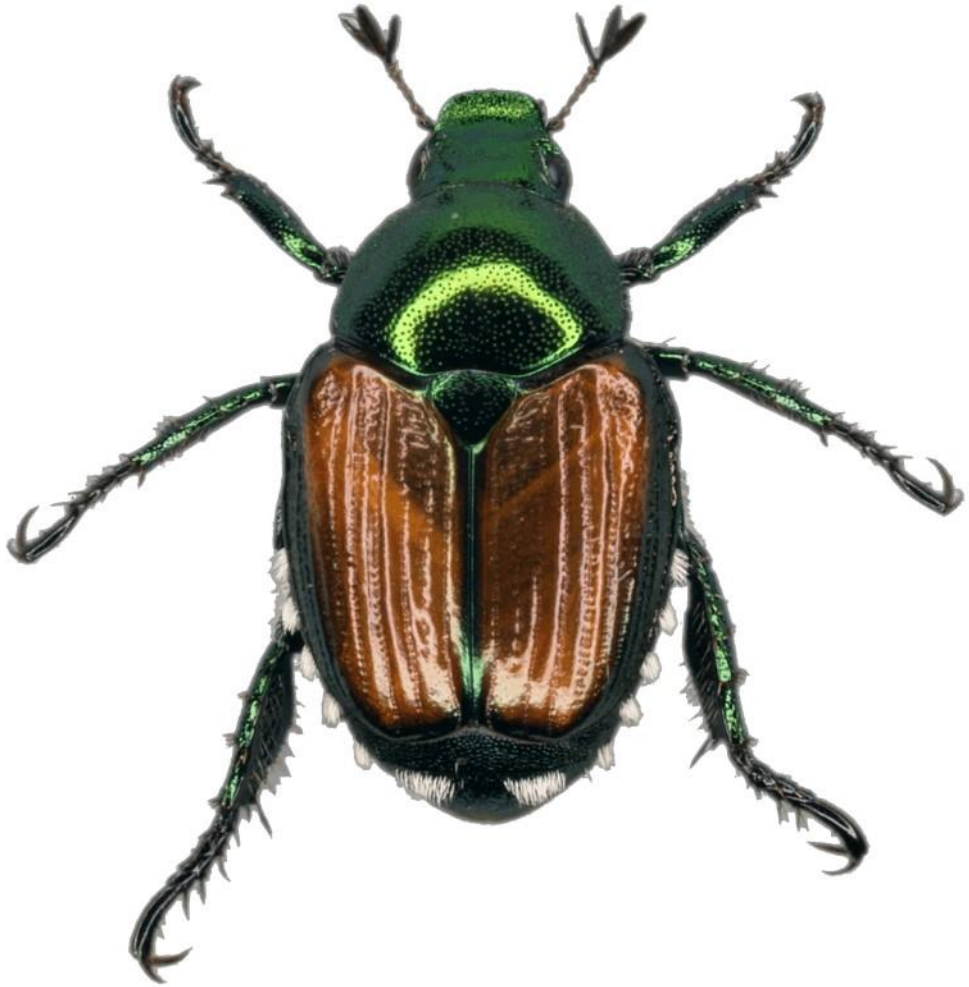
In1916, about a dozen beetles were collected at a nursery outside of Riverton, NJ- may have been imported as grubs as early as 1911

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

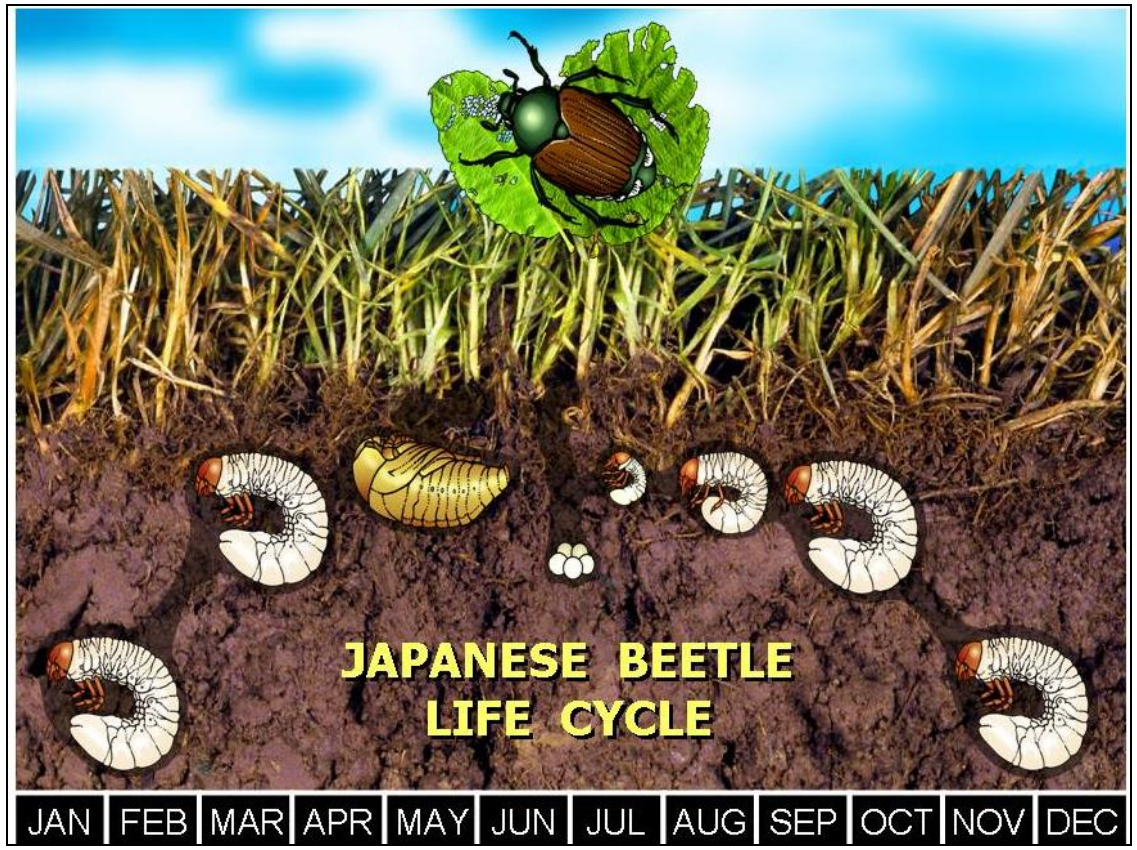
Green June beetle is often found at the scene of the crime with Japanese beetles

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

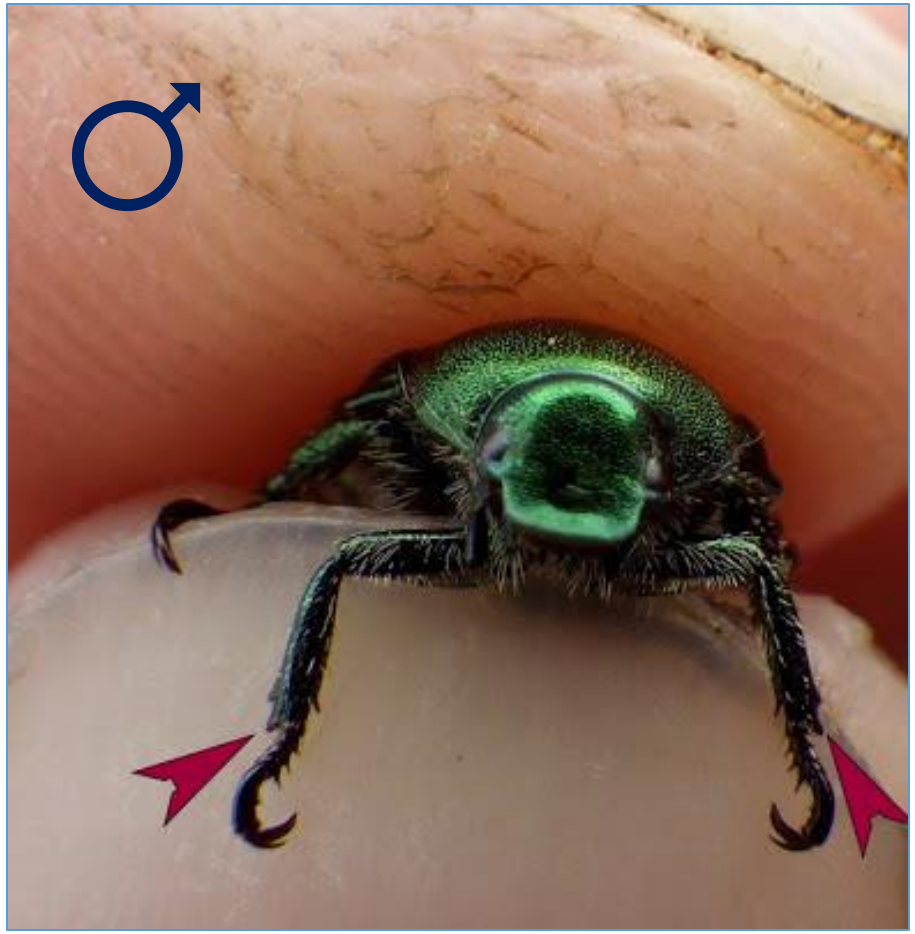
Not plant pests but do become fall home invaders

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



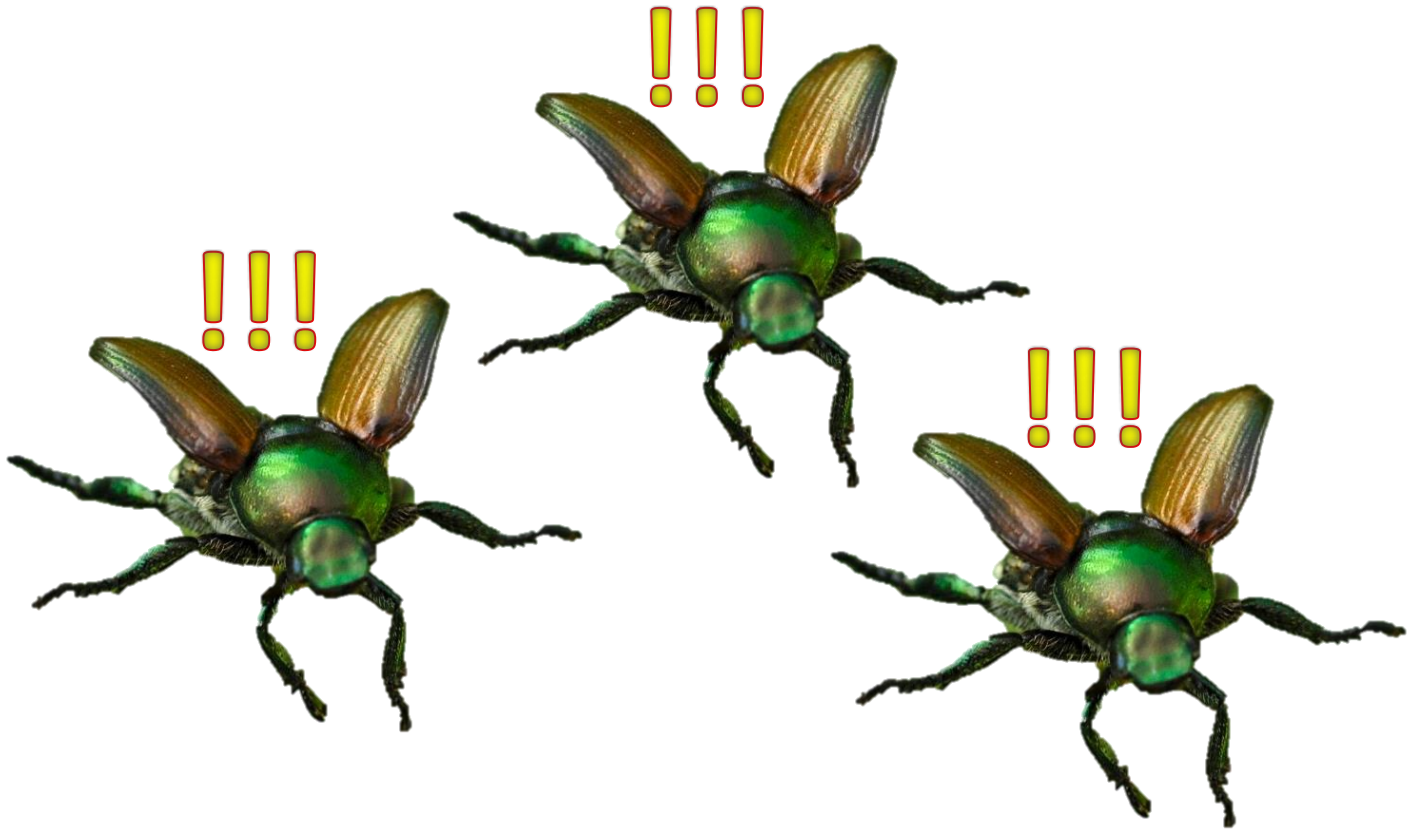
Emergence times vary based on location, the South is earliest New England last

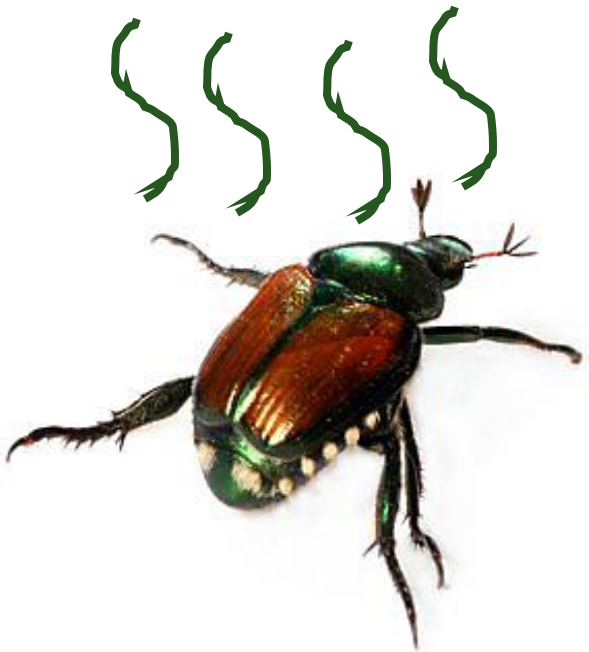
Males emerge from soil before females do



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

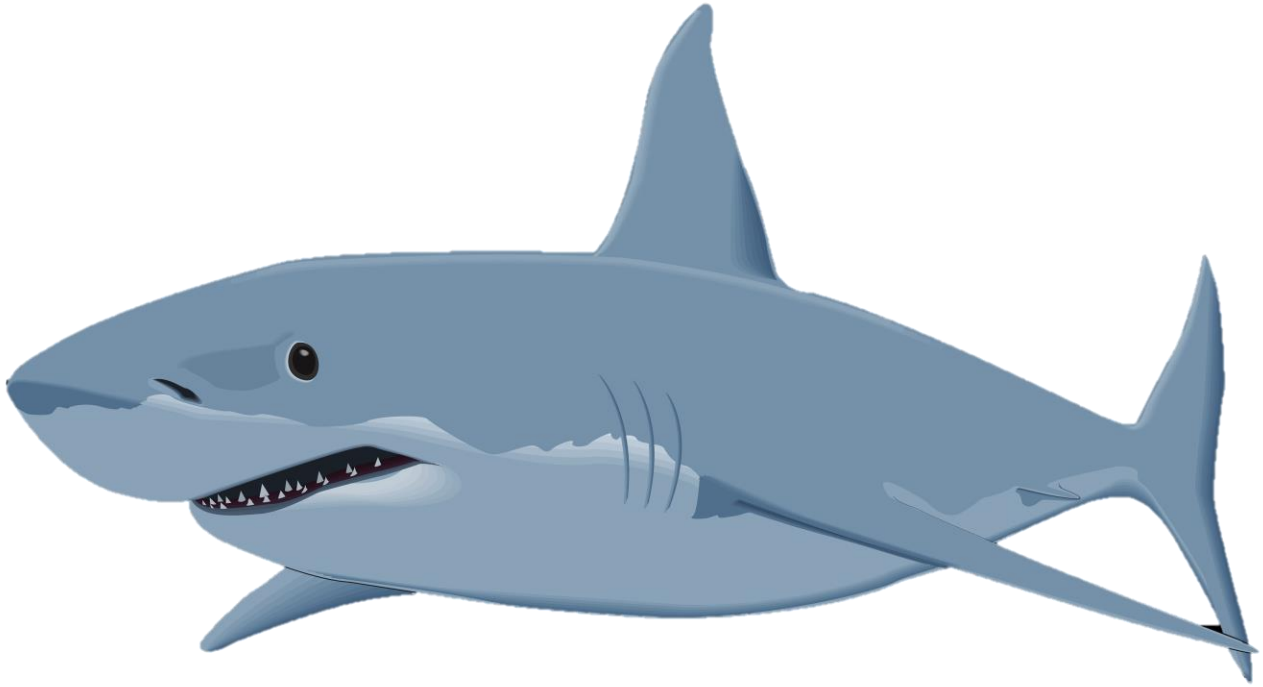
Female fertilizes eggs with the most recent sperm she received

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

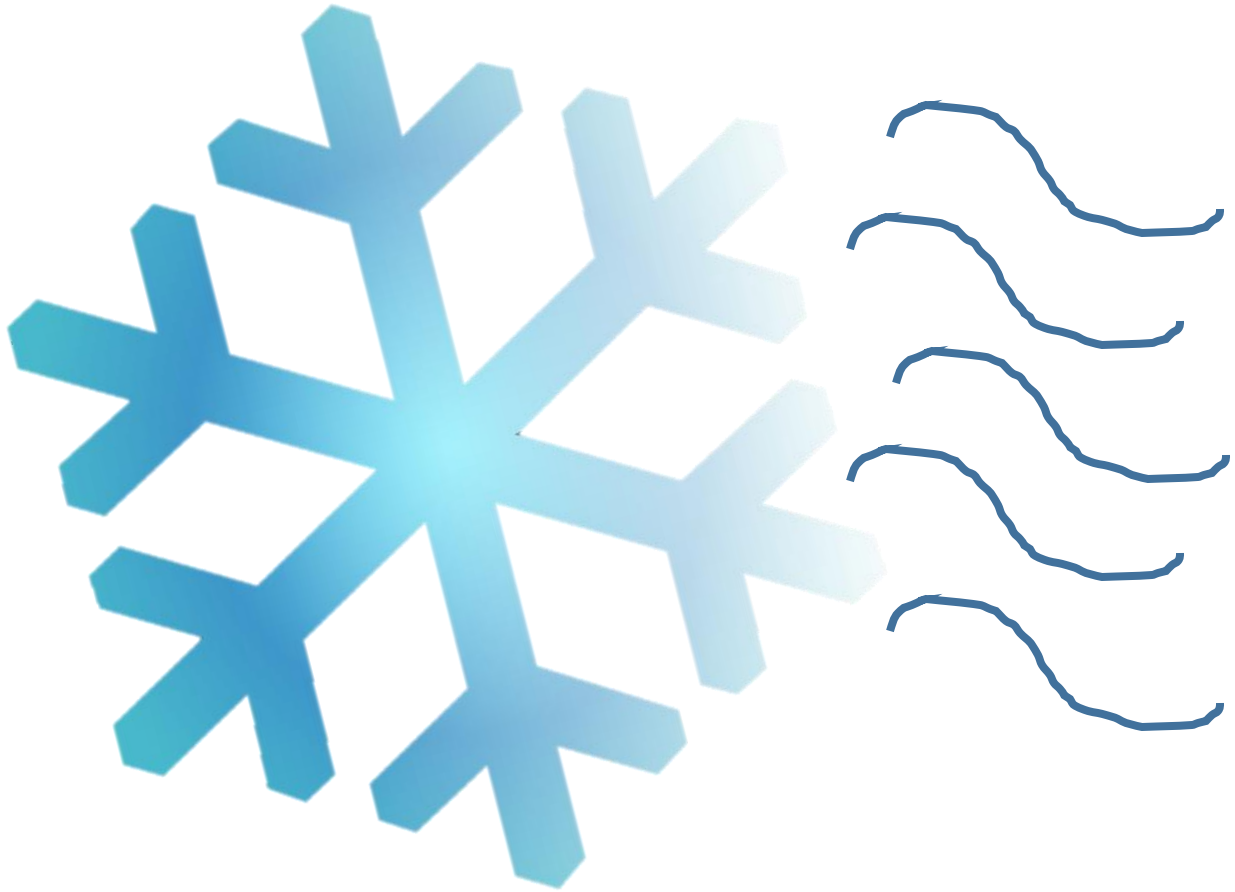
Eggs hatch in 10-14 days and grubs develop over the next 5-7 weeks

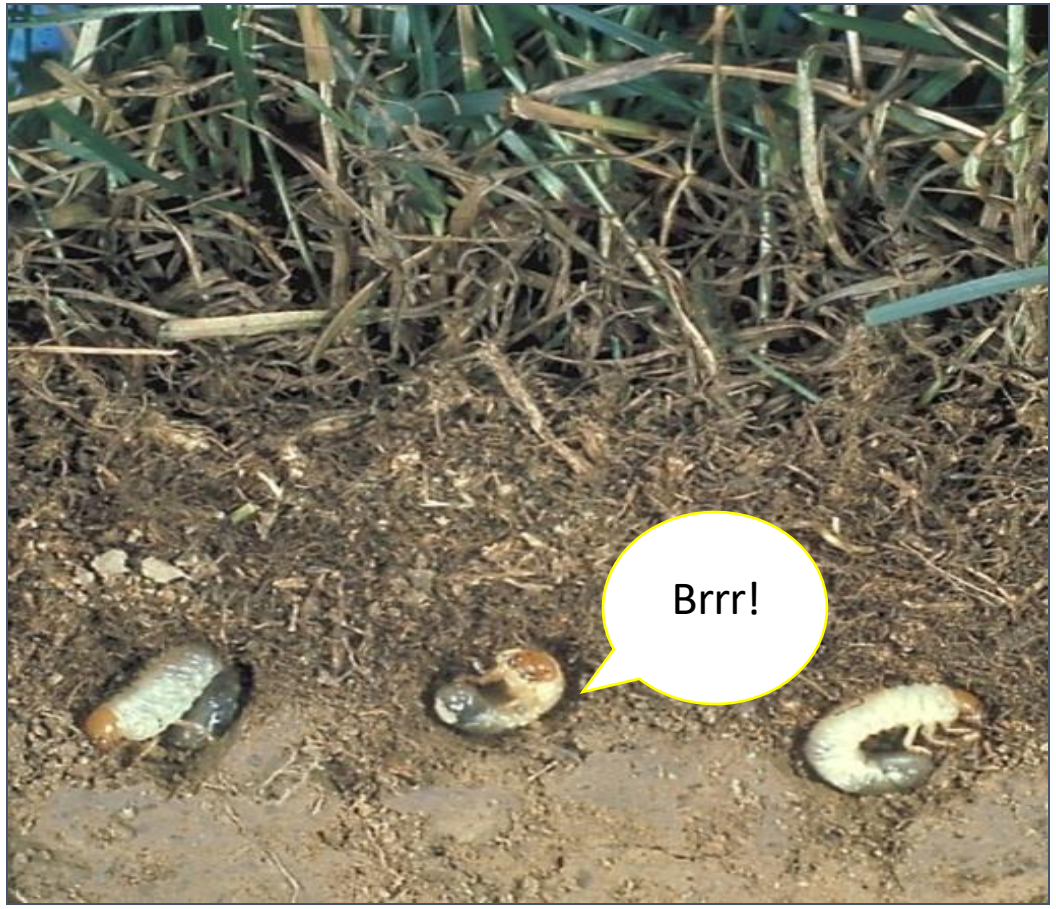
First instar grub stage lasts 2-3 weeks, second 3-4 weeks

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

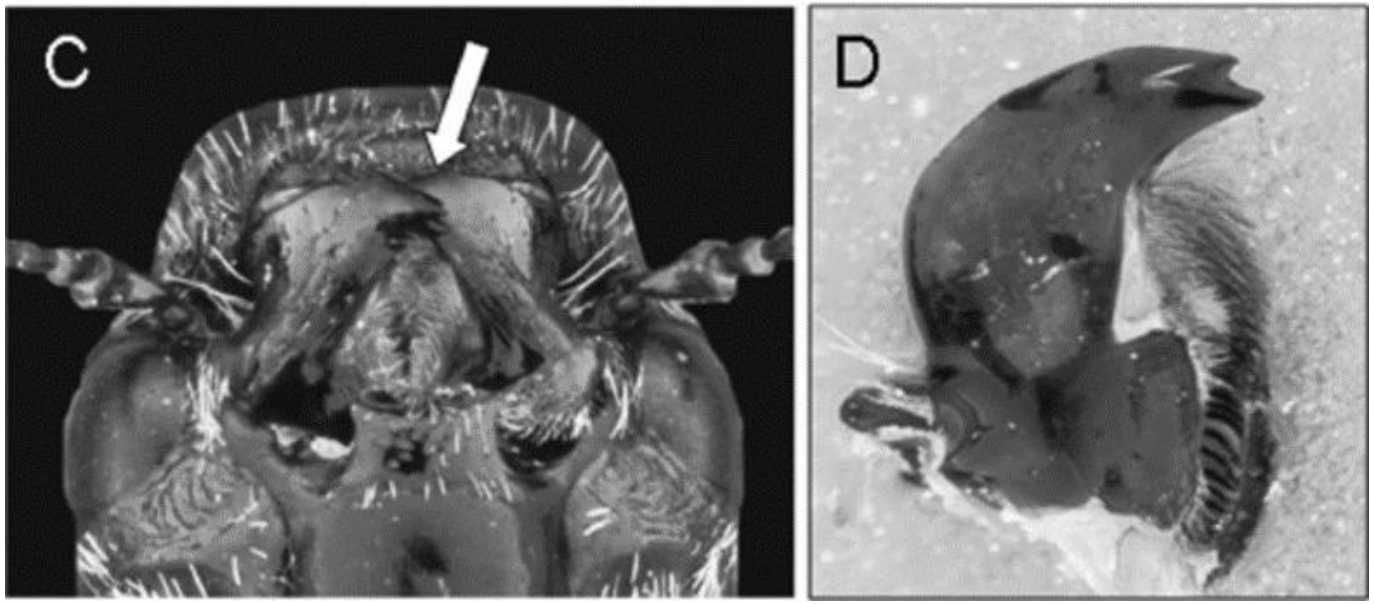
As pests Japanese beetles feed on >300 species of plants in 79 families

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

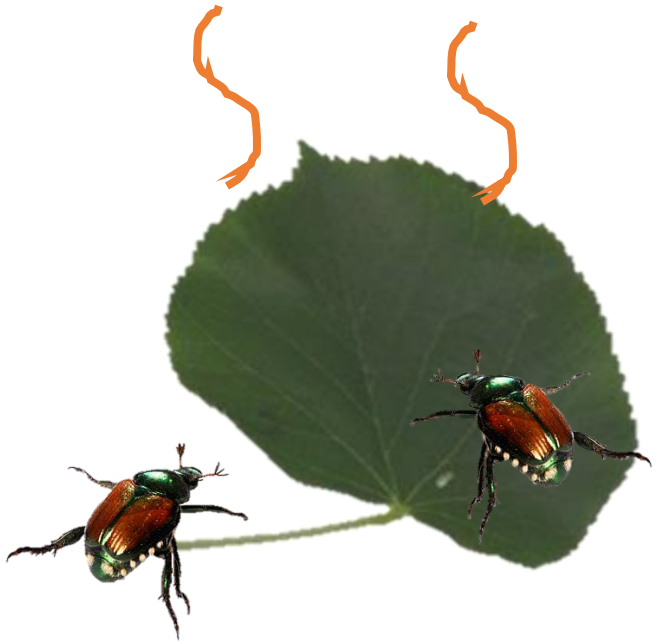


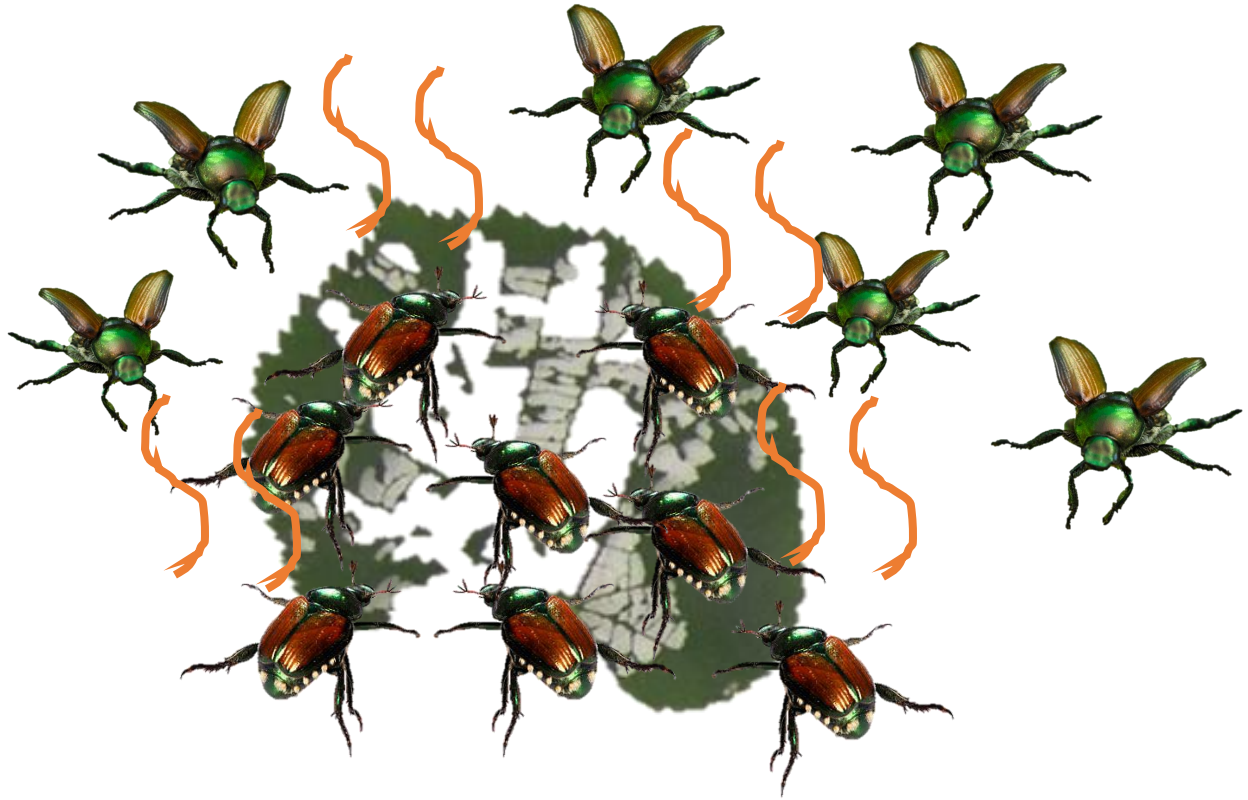
Japanese beetles have sharp mandibles that enable their polyphagy

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



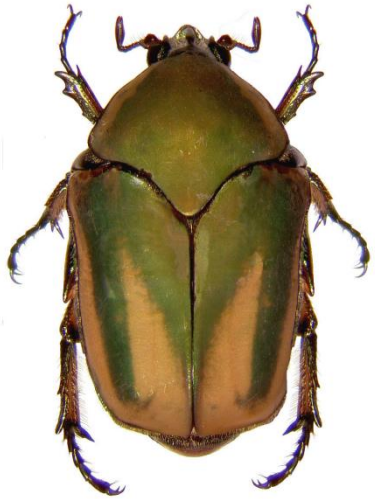


Damaged leaves leak volatile compounds at 1200-1500 hours, peak JB flight and mating periods

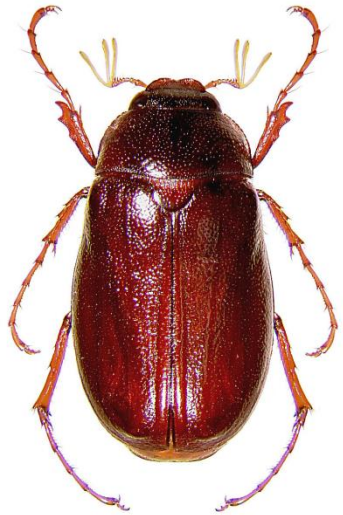
As part of the white grub complex JB is a pest of turf as well

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

White grub rogues gallery



Green June Beetle



May-June Beetle

Masked Chafer

Japanese Beetle

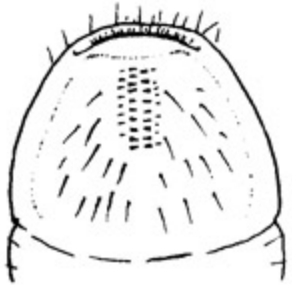
Green June Beetle

May-June Beetle

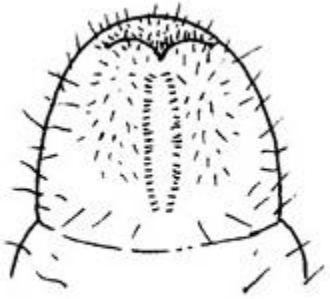
Masked Chafer

Japanese Beetle

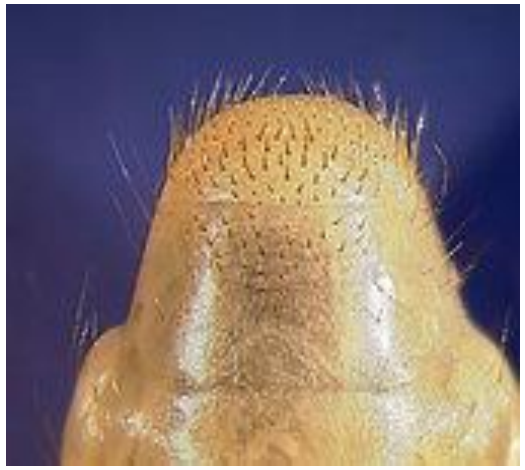
White grub identification depends on the raster pattern at the posterior tip of grub

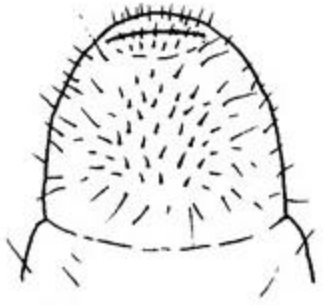


Green June beetle

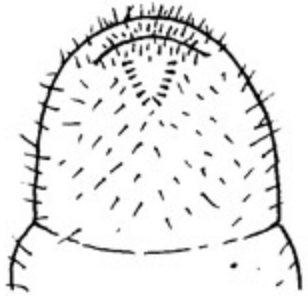


May or June beetle





Northern-southern masked chafer



Japanese beetle

Grubs feed at the soil-thatch interface

Feed on roots of turf, weeds, and some crops

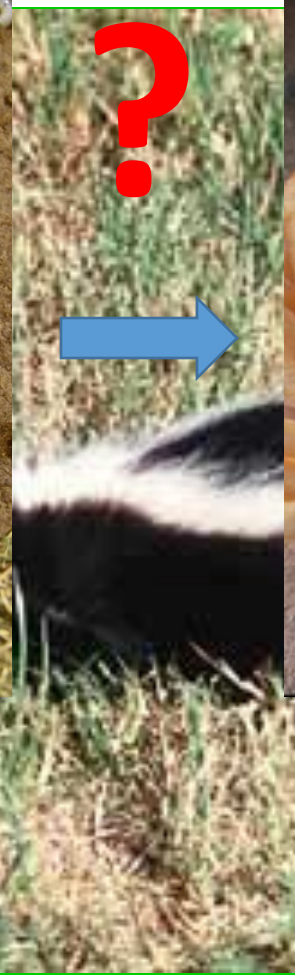
Grub damage is the worst in late summer and fall

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

MERIT®

Clothianidin

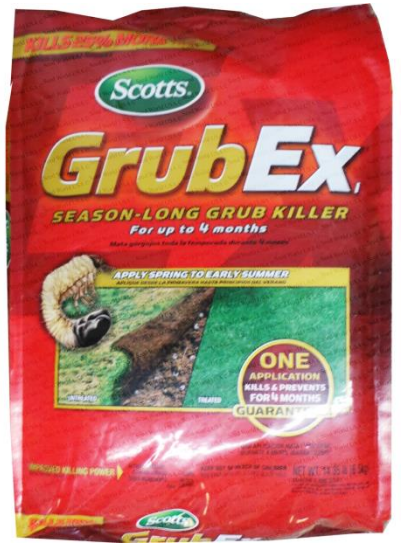
Arena®

Thiamethoxam

Meridian™ Insecticide

Anthranilic Diamides

Acelepryn®



Optimal timing for preventive control:

May to mid-July

Modern <u>preventive</u> 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.

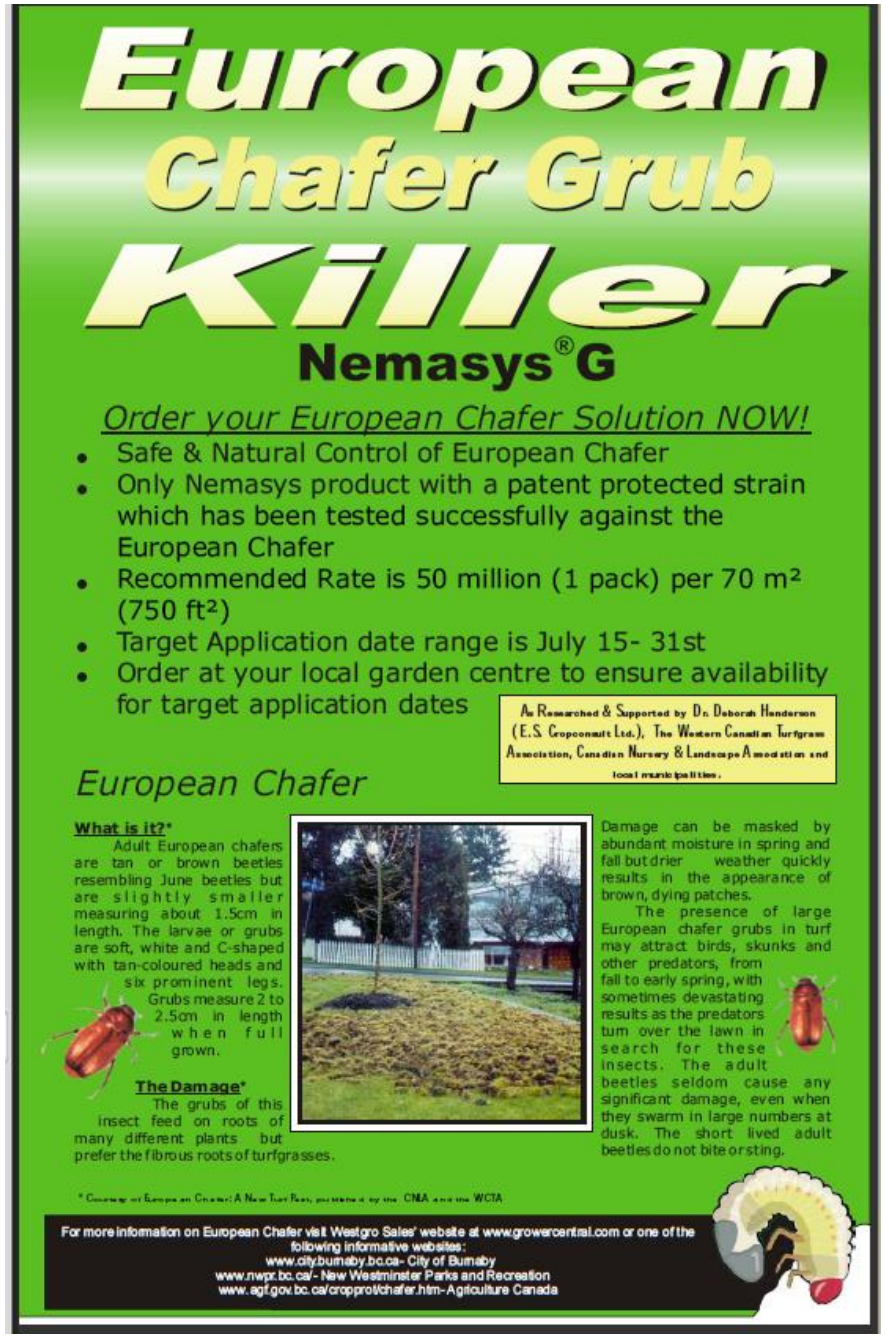
Biological control: 2 nematodes, *S. carpocapsae* and *H. bacteriophora* show promise in turf

Can successfully suppress white grubs, caterpillars, and bill bugs

Nematode products

Nemasys G® *(from Becker Underwood)*

NemaSeek® *(from Arbico Organics)*

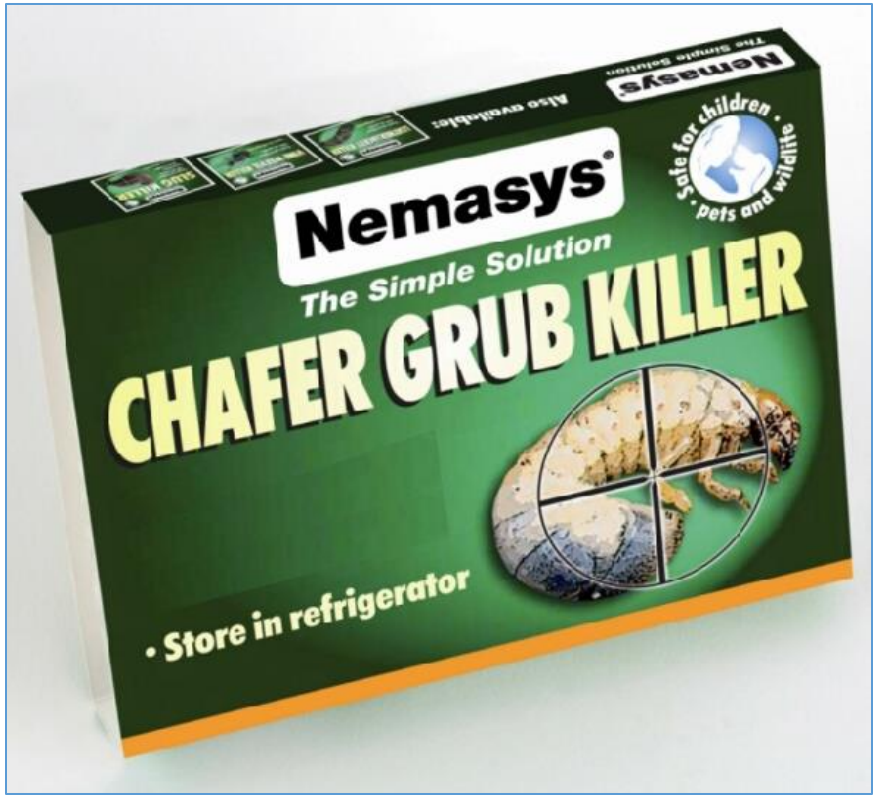


Nematodes do have some biological limitations you have to remember

They don’t deal with the sun/heat

Require post-treatment irrigation

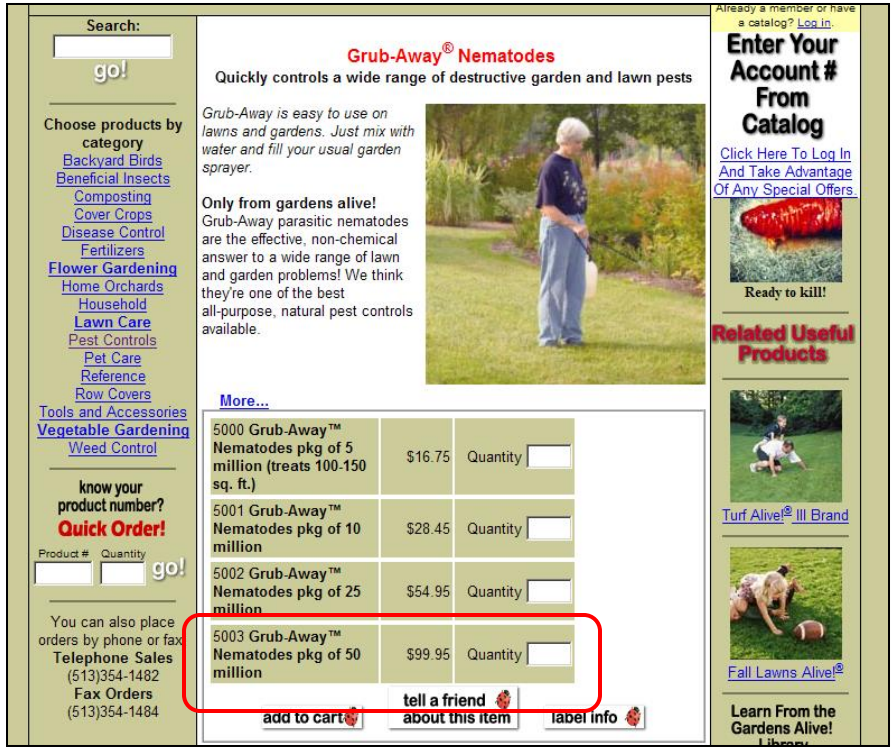
There are also troubles with getting the nematodes to the consumer



They have a limited shelf life in package

Curative control only

Relatively high cost still when compared to insecticides

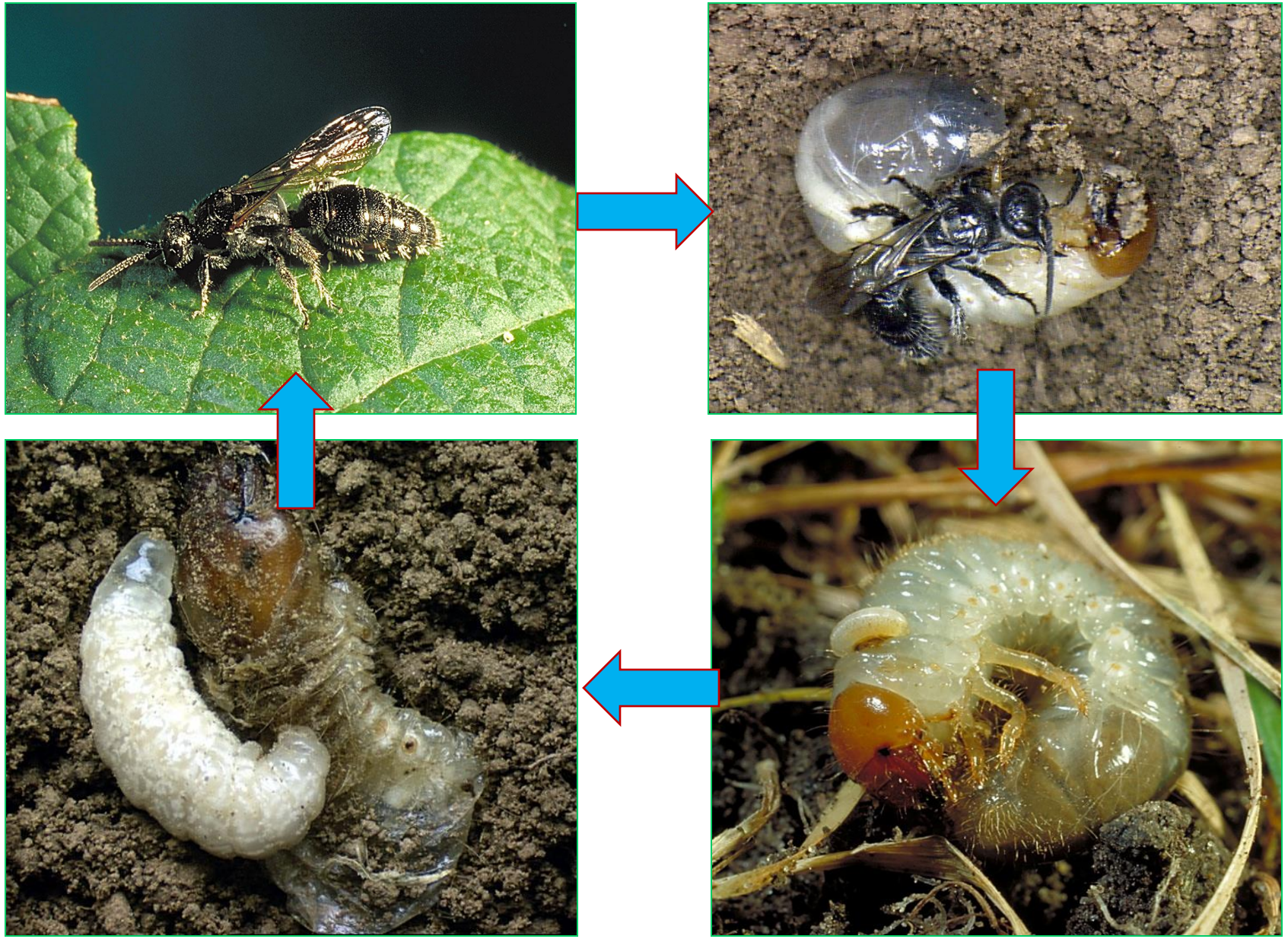


Gardens Alive: $1000

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

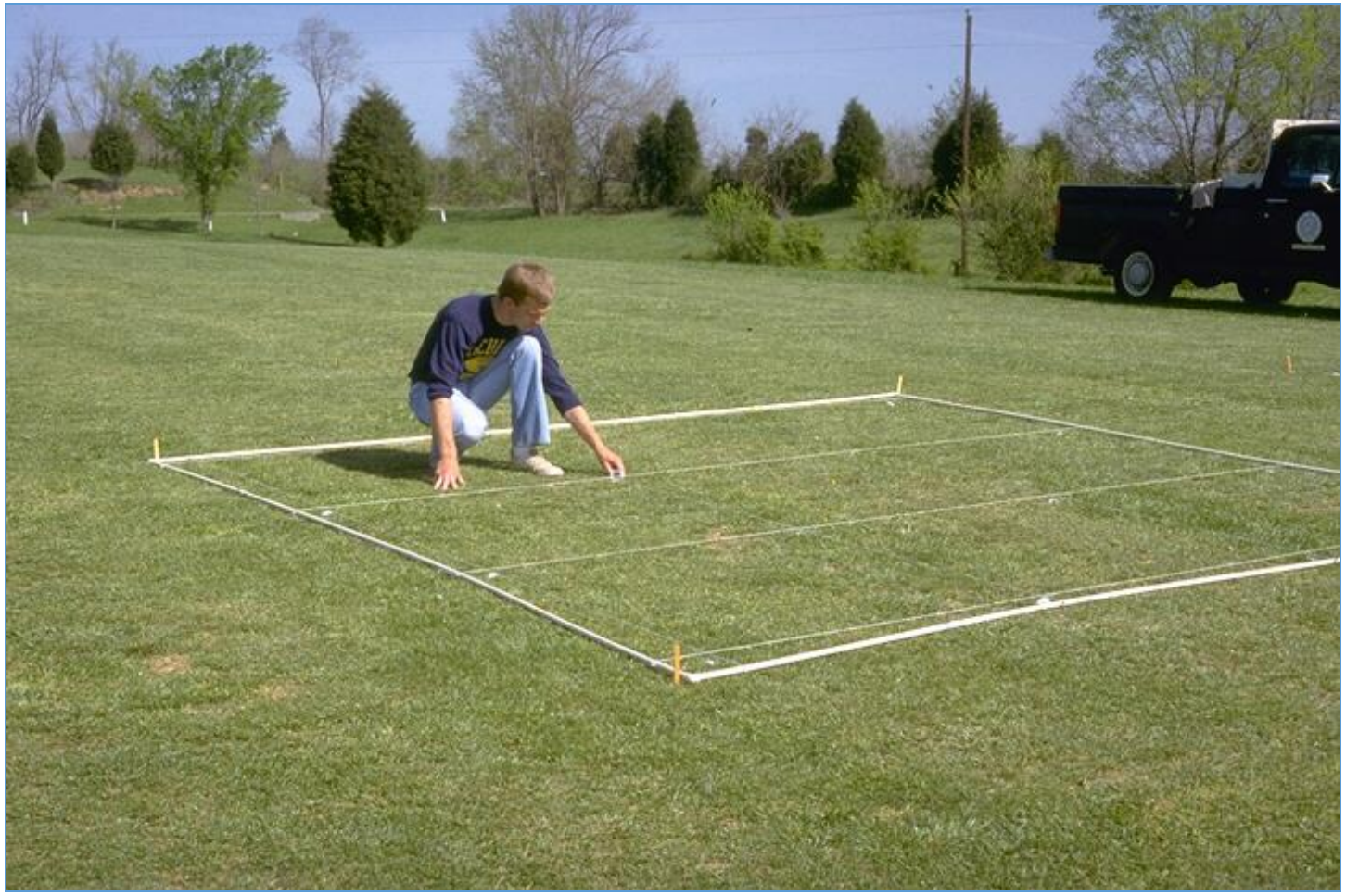
Details

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.

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

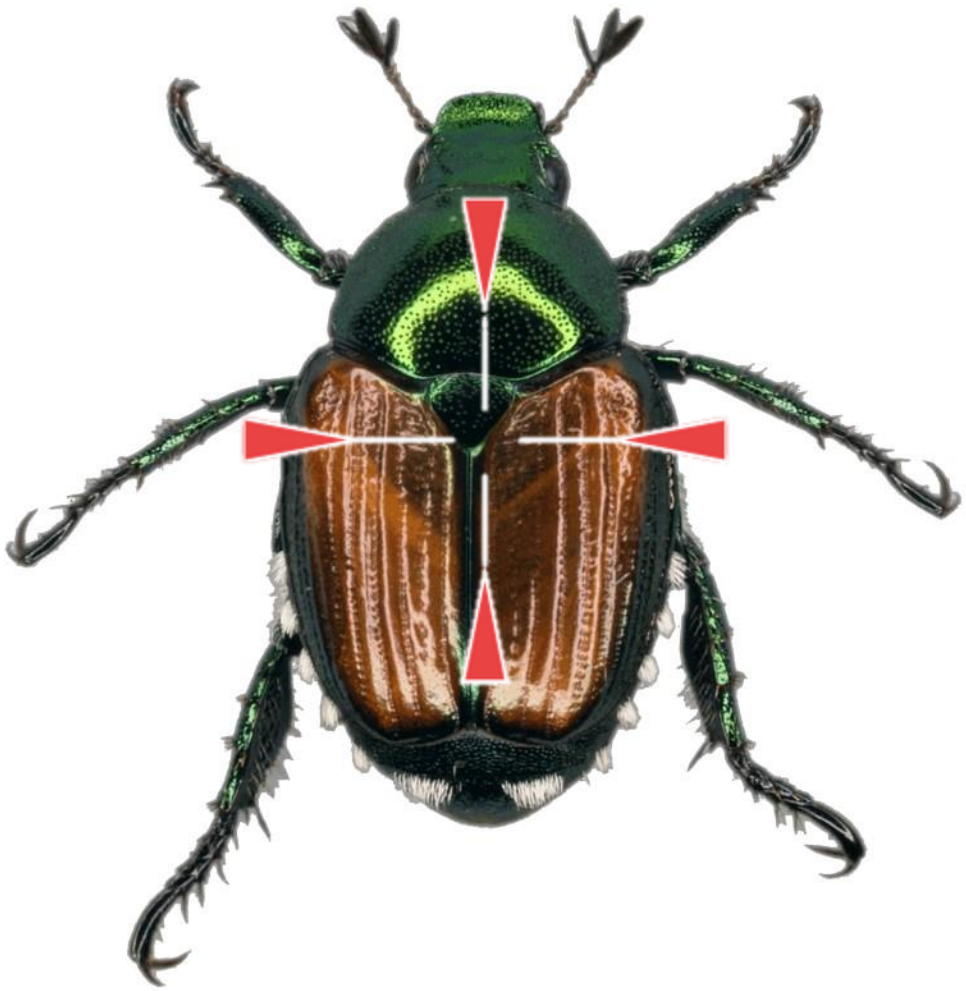
Japanese beetle adult control with synthetic products: Foliar sprays during peak flight

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

View Cart: $0.00 (0 Items)

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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.

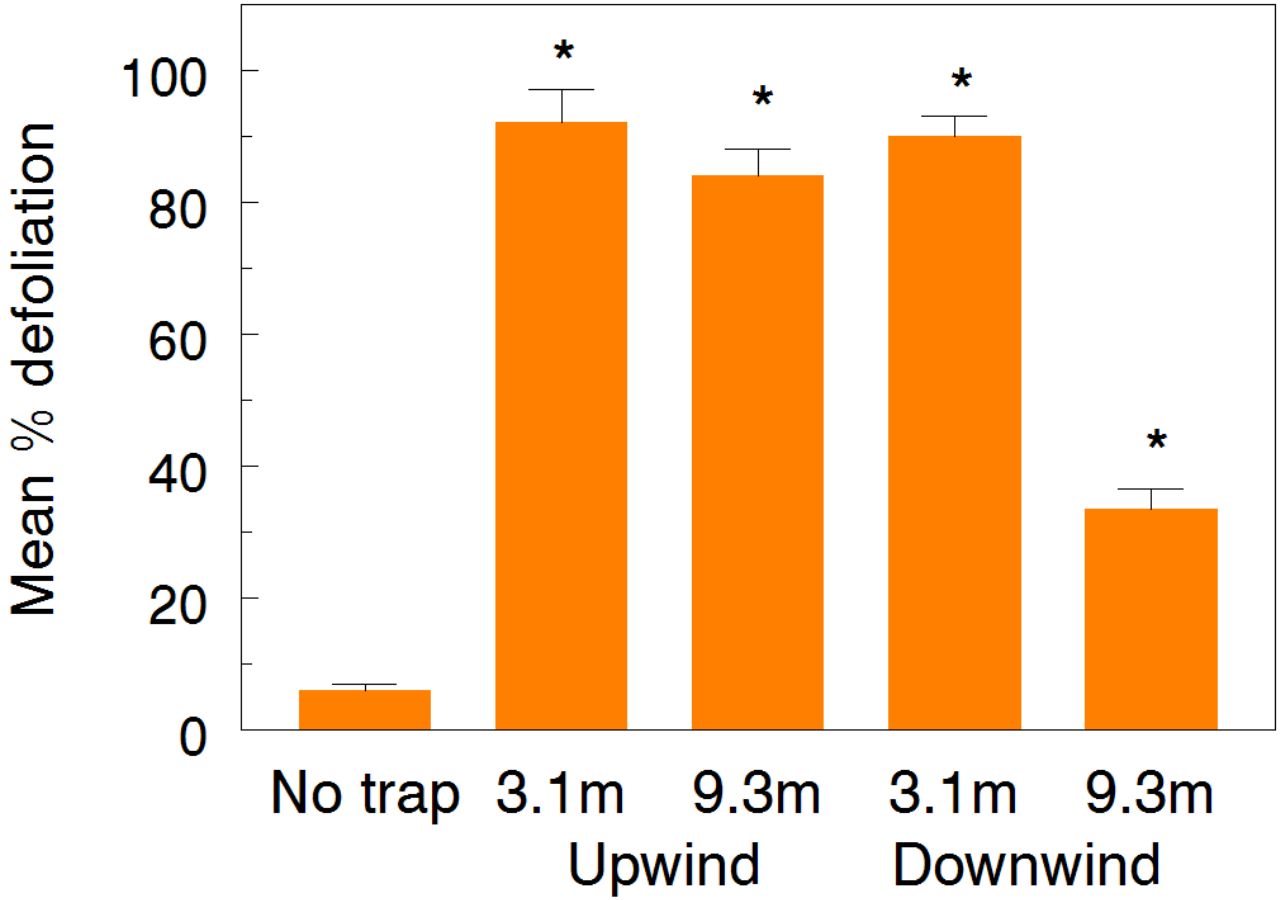
Commonly used, perhaps shouldn't be!

429,562 beetles: 10 day’s catch


Test
Plant
Trap
Trap placement was evaluated in 24
home landscapes

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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